

abi air balance

A Mestek Company

Premium Life Safety and Air Control Products



Putting Life Safety First!

www.airbalance.com

air balance

Dampers  Louvers
UL Life Safety Products
Division of Mestek
Member of AMCA

air balance 50 Years of Distinction

Our History

Air Balance Inc. was founded in Philadelphia in 1958 to manufacture louvers and dampers, with special emphasis on fire dampers. In 1964, Air Balance revolutionized the Life Safety Industry by inventing and introducing the curtain blade fire damper, which is still the industry standard. As HVAC systems have become more sophisticated, Air



Balance has continued its role as the industry leader in developing the state of the art UL classified life safety products including fire, fire/smoke and smoke damper for both static and dynamic applications.

Air Balance was acquired by Mestek, Inc. in 1977. Today, the company is a wholly owned subsidiary of Mestek, Inc., a large and diversified HVAC and machinery manufacturer that conducts operations worldwide. The principal manufacturing facilities for Air Balance, Inc. are located in Florence, KY, Forest City, AR and Wyalusing, PA with UL certified testing laboratories in Bradner, OH.

From its humble beginnings in 1958, Air Balance has become the industry leader in innovative products for life safety and air movement and control products. We have and will continue to develop products for all sectors of the HVAC industry. We are a proud member of the U.S. Green Building Council and many of our designs qualify for LEED credit.

50+ Years and Going Strong

For over 50 years, engineers and architects worldwide have specified Air Balance products because of our reliable performance in product design, quality and delivery. Our innovative designs are the preferred choice of specifier's for life safety, air control and louver products in the HVAC industry today. In addition to inventing the curtain blade fire damper, we have designed the most energy efficient fire/smoke damper available from any manufacturer, anywhere. Our louver offering includes the widest selection of stationary, combination, acoustical, hurricane and sand louvers from any manufacturer. Our reputation for quality and service is unparalleled by any other supplier. We take pride in not only our products, but in our people who make our success possible.

Performance Counts at Air Balance

Air Balance is committed to providing our customers with the highest level of quality and service. Our professional representatives and our staff of experienced employees have a well deserved reputation for meeting the needs of today's fast paced marketplace effectively and on time, every time. At Air Balance, customer service is the focus and responsibility of everyone, not just our outstanding customer service department. We recognize that our customers need solutions to their needs that they can rely on, so we have established the highest quality network of well trained representatives both at home and abroad. With Air Balance, a solution to all of our customer's needs is only a phone call away.



air balance

Dampers



Louvers

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Excellence in Design Independently Tested

Over the years, Air Balance has led the industry with new product design as well as existing product design to provide our customers with the most reliable and cost effective solutions to their life safety and air movement and control needs. We maintain our own testing laboratory in Bradner, OH where extensive research and development of life safety, air control and air movement products is conducted. Our Elevated Temperature Test Facility is both Underwriter Laboratories (UL) and ISO 9001 certified, and is the largest such facility worldwide. Additionally our air movement and air control lab is registered with by the Air Movement and Control Association (AMCA). All Life Safety products are licensed to bear the UL label, meaning that they have been independently tested and certified to meet UL standards. Our offering of control, balancing, and industrial dampers along with our louver products carry the highest percentage of independently tested and verified AMCA seals of any manufacturer in business today. Our philosophy is to provide our customers with the highest level of performance possible and to independently test and verify that the performance of our products meets the reliability standard that our customers require.



Delivered on Time, Every Time

Air Balance has consistently outperformed the industry in on time performance. Our standard lead time for most products is 10 working days. Our Premier Rush Program offers 24 hour, 48 hour, and 5 day premium service when quick delivery is a must. We offer the largest selection of products available for our Premier Rush Program of any manufacturer on the planet. We will not be outperformed by anyone!

Air Balance Mission Statement

Air Balance is committed to being the supplier of choice for all segments of the markets that we serve. We will continue to succeed in our goal by:

1. Providing a culture of continuous improvement within all of our facilities in every department.
2. Treating our valued partners, customers and vendors with the respect and consideration they deserve from us each and every day.
3. Provide a reasonable rate of return to our shareholders, without whom we would not exist.

Please see our website www.airbalance.com for more information.



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Partial List of Projects

Qurayyah CCP, UAE	High Performance Sand Louvers
King Abdullah University. of Science and Technology, Saudi Arabia	Fire/Smoke Dampers, Stainless Steel Control Dampers
Pentagon Renovation, Washington, D.C.	Fire and Fire/Smoke Dampers
World Trade Center, Buildings 5 and 7, New York, NY	Intake and Exhaust Louvers
Brigham and Women's Hospital, Boston, MA	Combination Louvers and Fire Dampers
Dulles International Airport, MA	Acoustical Louvers
Foxwood Casino and Resort, Mashantucket, CT	Louvers and Air Control Dampers
Penn State University, Life Science Center, Fayette, PA	Louvers, Sunshades, Air Control and Fire/Smoke Dampers
Mellon Bank HQ, Pittsburg, PA	Acoustical Louvers
Praire Flats Cogeneration Facility, Denver CO	Gravity Ventilators, Air Control Dampers, Louvers
Citibank Office Towers, Tampa, FL	Hurricane Louvers, Fire Dampers
The DACARE NACC Bldg, Appleton, WI	Extruded Aluminum Penthouses
Land Shark Stadium (formerly Joe Robbie Stadium), Miami, FL	Hurricane Louvers, Air Control Dampers
Rutgers University Nursing Dormitories, Newark, NJ	Balancing and Fire Dampers
University of Arizona Psychiatric Hospital, Tucson, AZ	Fire and Fire/Smoke Dampers
Duke Energy PP#7, Louisville, KY	Acoustical Louvers, Air Control Dampers
Ford Motor Company HQ, Detroit, MI	Fire and Fire/Smoke Dampers
US Embassy, Dubai, UAE	High Performance Sand Louvers
Staples Arena, Los Angeles, CA	Steel Louvers, Fire/Smoke Dampers
Denver International Airport, Outlying Concourses, Denver, CO	Fire and Fire/Smoke Dampers
Yonggwang Nuclear Power Plant, South Korea	Air Control and Fire Dampers
Lungmen Nuclear Power Plant, Taiwan	Air Control and Fire Dampers
Philadelphia Children's Hospital, Philadelphia, PA	Fire/Smoke Dampers, Penthouses



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UL Life Safety Products

Version 11.02

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POLICIES AND PROCEDURES

Reed National Air Products Group's operational office is located in Florence, KY, which is a suburb of Cincinnati, Ohio. This facility houses offices for the following divisions:

**Air Balance
Phillips-Aire**

Address: 7435 Industrial Rd.
Florence, KY
Phone: 859-538-3400
Fax: 859-647-2299

STANDARD ORDERS

When an order is placed, it is in our mutual interest to have it processed, engineered, built, and shipped as quickly as possible. To assure that this sequence of events is handled expeditiously, we need specific and complete information on our standard order form. **Orders submitted on anything other than our standard order form will be subject to a \$5.00 net charge.**

1. **Our standard is width first and height second. All dimensions are to be stated in inches. If the order is submitted with dimensions reversed or in other than inches and a conversion error occurs, it is the representative's responsibility.**
2. Please fill out the form completely, including pricing. It is not necessary to forward your own purchase order form unless we are to invoice the customer directly. In the instance of a direct billing, we must receive the original customer's purchase order, addressed to us, in care of your company in addition to our standard order form.
3. If specifications are available, copies of all pertinent sections should be sent to us. These might include sections such as structural, painting, electrical, etc. as well as the product specifications. General arrangement drawings may also be helpful. Unless you review and provide **complete** plans and specifications including **all addenda**, we cannot accept an order which states "**as per plans and specifications.**" Orders of this type must have a minimum of \$5,000 net value.
4. In the event that the order calls for equipment similar to equipment furnished on a previous order, be certain that our production order number, sold to, and date of shipment are shown.
5. Be sure that the purchase order states acceptance of any exceptions indicated in our quotation, if applicable.
6. In order to give you better service, it is imperative that all orders contain complete shipping information. **Orders that do not contain complete shipping information will not be processed unless prior approval from Customer Service has been obtained.**

7. If you do not have a sales tax exempt certificate on file and request tax exemption, please specify your tax exempt number. If sale is taxable, please specify tax rate. If we are invoicing your customer, we need their tax exempt number.

PREMIUM SERVICE CHARGES

From time to time, delivery is required in less time than our published standard or rapid ship programs. On an availability basis, a special handling premium may be applied to improve shipment. **The charge for this service will vary depending on requirements.** This charge also has the following conditions:

- A. Premium time is not always available. Contact Customer Service for availability and premium charge.
- B. Charges do not include special shipping arrangements.
- C. Premium time estimates are based on prompt credit clearance.

MINIMUM ORDERS

There will be a minimum invoice of \$60.00 net per purchase order for all divisions of Reed National Air Products. This minimum will apply to all products with the exception of spare parts.

There is a \$30.00 net minimum on all orders for spare parts.

CHANGE ORDERS

A \$15.00 net minimum will be charged for any change to an order once it has been entered into our computer system. This fee will also be imposed on any order based on a factory quotation not referenced at the time of order entry. If a change required additional engineering time, an appropriate charge will be assessed.

ORDERS PLACED ON HOLD

When we receive notice that you or your customer wants to place an order on hold, **we stop all work.** We cannot hold a scheduled ship date on a held order. **Orders placed on hold are subject to a \$15.00 change order charge.**

CANCELLATIONS

Once an order has been released for production, the minimum cancellation charge will be \$15.00 net. This minimum will increase in direct proportion to the amount of engineering time, production time, and material already expended at the time of cancellation.

RUSH ORDERS

Once a "rush order" is received by Customer Service, it cannot be cancelled. **If you insist that we do not ship, the cancellation charges will be equal to the full billing amount.**

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SUBMITTAL DRAWINGS

Submittal drawings of standard products are a part of your catalog and are available via the internet. We expect our agents to process submittals of this type. When required, we will provide certified standard catalog drawings at a rate of \$10.00 net per drawing.

AIR FREIGHT CHARGES

When you request air freight, our Customer Service Department will make all of the arrangements. Unless otherwise noted on the order, we will use the "second working day" delivery service. **Air freight charges are at your expense.**

PROBLEMS OR REPAIRS

From time to time, problems develop with equipment which has been shipped. These problems may be caused by a misunderstanding, errors, workmanship, damage at the jobsite, etc. The responsibility for such a problem is not always apparent from the first report. We reserve the right to make an investigation of the problem before assuming any responsibilities.

In the event that we determine the responsibility for corrective action is ours, we reserve the right to determine the manner in which such action is to be accomplished. We may elect to take one of the following actions:

1. Send factory personnel to make an inspection and/or corrections.
2. Have the equipment returned to us for corrections or replacement.
3. Authorize the installing contractor to make the necessary repairs.
4. Hire another contractor to make the repairs.
5. Other suitable action.

We will not honor backcharges or invoices for work done unless we have agreed in advance to accept those charges.

RETURNED MATERIALS

Contact our Customer Service Department via fax or email so that an agreement can be made on why the material is to be returned and that is of enough value to warrant the cost of return. Please keep in mind that our warranty policy does not allow the return of material after one year from the date of shipment. Other warranty periods may apply to accessories and finishes.

The faxed or emailed information must include the following information:

- A. Our production order number.
- B. The sold to.
- C. Approximate date of shipment.
- D. Quantity and description of material being returned and reason for returning.

Our Customer Service Department will forward to you a Return Goods Authorization (RGA) indicating the conditions of the return. The only action required by you is to fill in the date the material is being returned. Make a copy of the RGA and include it with your returned shipment. Make sure you keep your copy!

Make sure the material is returned to the location shown on the return material form. **We will not accept goods being returned unless we have authorized their return in advance.**

TERMS AND CONDITIONS OF SALE
Version 2010-A

1. GOVERNING TERMS AND CONDITIONS

Unless another document related to terms and conditions is issued by the seller, these standard terms and conditions of sale shall apply to all orders for product (hereinafter "Product" or "Products") between the purchaser (hereinafter "Buyer") and the seller of the Products (hereinafter "Seller"). These TERMS AND CONDITIONS OF SALE (hereinafter "Terms & Conditions") shall not apply to the offering of non-Product services. Such non-Product services shall be governed by the TERMS AND CONDITIONS OF SALE contained in Seller's proposal or quotation for such non-Product services. In the event that Seller issues a formal proposal or quotation to Buyer for the sale of Products then any order resulting from said proposal or quotation shall be governed by the terms and conditions referenced in the proposal or quotation. Buyer shall be deemed to have accepted these Terms & Conditions through (i) delivering a purchase order or a purchase order number to Seller or (ii) receipt and acceptance of Products or (iii) payment of Seller's invoice for the Products or (iv) by failing to provide Seller with written notice of rejection of the Terms & Conditions within three (3) business days from the date of receipt of the Products or (v) any other written indication by Buyer of its acceptance of the Terms & Conditions. Any terms and conditions contained in any purchase order, correspondence or accompanying payment for delivery of the Products, which are different from or in addition to these Terms & Conditions, shall not be binding on Seller, whether or not they would materially alter the order, and Seller hereby objects thereto. The scope of work under any Products order does not include installation or any on-site services.

2. CONFIDENTIALITY

All information, including quotations, specifications, drawings, prints, schematics, and any other engineering, technical or pricing data or information submitted by Seller to Buyer related to any order for Products are the confidential and proprietary information of Seller; and Buyer and its employees, agents or other parties for whom Buyer is responsible may not disclose Seller's confidential and proprietary information to any third parties, or use Seller's confidential and proprietary information for its own account or that of any third party, except in the performance of the order.

3. PRICE; PAYMENT TERMS

The price and payment terms for the Products shall be set forth by Seller at the time of a quotation to Buyer by Seller, placement of an order from Buyer to Seller, through an invoice to Buyer by Seller and/or in Seller's acknowledgement of order to Buyer. All payment terms are subject to Seller's credit approval as of the later of the time of the order and/or prior to shipment. Unless otherwise set forth in the order, payments are due to Seller from Buyer no later than immediately upon Buyer's receipt of an invoice from Seller. Time is of the essence with respect to all payments. Payments that are outstanding more than ten (10) days from their respective due date shall bear an interest rate of one and one-half percent (1½%) per month (eighteen percent [18%] annually) until fully paid, including any interest payments thereon. If the rate of interest stated in the preceding sentence exceeds the maximum rate of interest that the applicable state law allows, then the rate of interest that will be assessed is the state maximum. In the event Buyer does not pay within the terms of the order, all collection costs incurred by Seller, including attorneys' fees will be paid by Buyer.

Payment for the sale of Products shall not be subject to offset, deduction or back charges by Buyer, unless such offset, deduction or back charge is expressly accepted in writing by an authorized representative of Seller. Any sums that have been deducted by Buyer in violation of this paragraph shall be considered overdue and are subject to the above interest charge. The price set forth in the order and all payments due to Seller from Buyer shall be in the lawful currency of the United States of America.

Notwithstanding the foregoing or any term in the quote, order or acknowledgement to the contrary, to the extent that anytime prior to shipment Buyer does not meet Seller's credit approval, Seller may either (i) cancel the order, subject to Section 5 below or (ii) request payment in full from Buyer prior to shipment of the Product.

4. CHANGES

Changes to the design, specifications, scope of supply, delivery schedule, product demonstration site, shipping instructions of the equipment or any material term of the Contract, may only be made upon execution by Buyer and Seller in writing ("Change Order"). Such Change Order shall state the parties' agreement on (i) change in the specifications, designs, scope of work, delivery schedule or shipping instructions for the equipment, (ii) an adjustment to the purchase price, and (iii) an adjustment in the date of shipment of the equipment and/or the period of performance. Both parties agree and acknowledge that unless a Change Order is agreed upon in writing by both parties, the Contract shall not be modified in any manner. In addition, Seller has the right to suspend performance during the period while the change is being evaluated and negotiated.

In the event Buyer has communicated proposed changes to Seller, Seller, at its sole discretion, shall either (a) accept the Change Order; (b) reject the Change Order and continue performance under the existing Contract; or (c) cancel the Contract. In the event that Seller elects (b) above Buyer shall either (i) agree to continue performance (of Seller) pursuant to the Contract or (ii) cancel the Contract.

5. DEFAULT; CANCELLATION

If Buyer fails to perform any of its obligations hereunder, including without limitation, failure to make payments as provided in Section 3 or otherwise, or if Buyer fails to promptly give reasonable assurances of future performance when requested by Seller, then Seller may, upon five (5) days' written notice to Buyer, declare Buyer to be in default and Seller may suspend performance of its obligations hereunder without liability and retain all rights and remedies Seller may possess at law, in equity and/or as provided in these Terms & Conditions.

In addition to the remedies above, to the extent that (i) Seller declares a default under this Section 5 or (ii) if the order is cancelled for any reason, other than (a) default by Seller or (b) Force Majeure, Buyer will make payment to Seller of reasonable cancellation charges which shall include all incurred costs (direct material, labor, burden, and application engineering) on the completed work plus twenty-five percent (25%) of the order price.

6. TAXES, PERMITS, FEES, LAWS

Unless expressly stated in Seller's invoice, the purchase price for the Products furnished by Seller excludes all governmental or brokerage taxes, duties, fees, charges or assessments. Seller may elect to add any such taxes, duties, fees, charges or assessments to the invoice amount payable to Seller by Buyer. Buyer must provide Seller with documentation acceptable to Seller of any exemptions claimed from taxes, duties, permits, fees, charges or assessments in advance. Except to the extent expressly assumed by Seller, Buyer shall secure and pay for all permits and fees necessary for the delivery and installation of the Products and/or the equipment into which the Products are installed. It is Buyer's duty to ascertain that the Products proposed by Seller and their subsequent installation and use is in accordance with applicable local laws, statutes, ordinances and building codes ("laws"). Seller shall not be responsible for compliance of the Products or the equipment into which the Products are installed to such laws, but shall to the extent reasonably possible, promptly notify Buyer of any discrepancies that come to Seller's attention.

7. SHIP DATES; DELIVERY TERMS; TITLE; RISK OF LOSS

The scheduled dates for shipment of the Products are estimates based on production loading and/or third-party manufacturer's estimates at the time of order. Seller is not responsible for any actual, incidental or consequential damages arising by reason of any delay in delivery or shipment. Upon notification from Seller that Product is ready for shipment, Buyer must meet all obligations hereunder, including but not limited to payment, providing for delivery of the Product to the designated location, site preparation and all other obligations noted herein or in the acknowledgment. The term of delivery for all Products shall be "Ex Works Seller's Factory" (Incoterms), (hereinafter "Delivery"), with freight routing at the discretion of the Buyer unless oth-

erwise agreed. The term "Deliver", "Delivery" and/or "Delivered" shall refer to the transfer of Products to the Buyer as described in the Delivery terms. Partial shipments shall be allowed; however, Buyer understands and agrees that the quoted price is based upon Seller shipping all Products when completed by Seller. If multiple or partial shipments are required by Buyer, Buyer must notify Seller in advance of such requirement. If multiple or partial shipments are requested or are necessary because of acts or omissions on the Product of Buyer, then Seller reserves the right to adjust the price to reflect any additional costs that Seller may incur as a result of such multiple or partial shipments. Title and risk of loss to the equipment for all purposes shall pass to Buyer upon Delivery as defined above.

8. DELAYS, FORCE MAJEURE; SUSPENSIONS

If Seller is delayed at any time by the acts or omissions of Buyer, its agents, subcontractors or material suppliers, Change Orders, or by any Force Majeure defined below then the period of performance shall automatically be extended to accommodate Seller's revised engineering and production schedules, material purchases and/or labor remobilization. "Force Majeure" means circumstances beyond the respective parties reasonable control, including without limitation, acts of God, acts of public enemies, wars, other hostilities, blockades, insurrections, riots, epidemics, quarantine restrictions, floods, unavailability of components or supplies, lightning, fire, storms, earthquakes, washouts, arrests, restraints of rulers and people, civil disturbances, acts of any governmental or local authority, and any other acts and causes, not within the control of the party claiming excuse from performance, which by the exercise of due diligence and reasonable commercial effort, that party shall not have been able to foresee, avoid or overcome.

9. SOURCE OF PRODUCTS

Seller reserves the right to obtain and/or manufacture the Products from or at any one or more of its world-wide facilities or from any third-party manufacturer and the price of the equipment shall not be affected by the source of the equipment. Buyer shall notify Seller upon placement of order whether the source of the equipment may conflict with Buyer's requirements for country of origin labeling, content restrictions, or duty or freight, and Buyer and Seller shall consult with each other on the possible impact of such requirements on the price or availability. Buyer's failure to notify Seller shall create an irrefutable presumption that the source of the goods as selected by Seller are acceptable to Buyer and that Buyer will bear the costs and consequences thereof.

10. INSTALLATION

Buyer is responsible for the installation of the Products including, without limitation, all civil engineering work and foundations, unloading, unpacking and proper positioning of Products in Buyer's equipment and the costs of the foregoing. Seller's service department can make a service representative available for consultation on site with the Buyer's responsibilities above if so desired. This service will be priced at Seller's usual and customary daily service rates as announced from time to time plus reasonable expenses and will be subject to separate terms and conditions.

11. LAWS/SAFETY STANDARDS

The Buyer and end user are the parties responsible under the terms of all applicable Federal, state, local and regional laws applicable to the sale of Products including the Occupational Health and Safety Act of 1970, or the industrial safety laws applicable to the facility where the Products are installed, to ensure the Products and the equipment into which the Products are installed meet such requirements, and Seller hereby disclaims any liability for any violations of the Act or other applicable or regulation law that may be imposed respecting the Products furnished under any sale. Buyer shall train, require and cause its employees to (i) comply with directions set forth in maintenance, safety and operation instructions, manuals, drawings, safety notices and warnings and other instructions that might be furnished by Seller; (ii) use, reasonable care and all safety equipment and applicable safety guards and safety systems in the set-up, adjustment, operation and maintenance and repair of the Products and the equipment into which the Products are installed; (iii) not remove, or permit anyone to remove any safety equipment, safety feature or warning signs from the Products and the equipment into which the Products are installed nor permanently remove or disable any guards or safety features; and (iv) assure that the Products and the equipment into which the Products are installed are used in accordance with all applicable laws, regulations, customs, permits and standards in force.

12. ACCEPTANCE

Buyer's receipt of the Products Delivered hereunder shall be an unqualified acceptance of and shall also constitute a waiver of any defect which reasonable inspection would have revealed unless Buyer gives Seller notice of rejection of the Products within thirty (30) days after such receipt. In the event that Buyer gives such notice of rejection, Buyer shall afford Seller (i) reasonable opportunities to inspect any alleged non-conforming Products and (ii) a reasonable opportunity to provide substitute conforming Products. Buyer shall not return any Products without Seller's prior written consent.

13. FORUM/GOVERNING LAW

Any hearing, trial, proceeding or other meeting with respect to all claims, disputes or controversies (whether in contract or tort, pursuant to statute or regulation, or otherwise, and whether pre-existing, present or future) arising out of or relating to these Terms and Conditions of Sale or the order will be held in Hampden County Massachusetts United States of America, and the proceedings shall be conducted and all submissions of the Parties shall be in the English language. BOTH PARTIES WAIVE THE RIGHT TO A JURY TRIAL. This provision shall survive the termination of any order governed by these terms and conditions of sale. The governing law shall be the laws of the Commonwealth of Massachusetts. With respect to international transactions, the UN Convention On The International Sale Of Goods is hereby excluded from application.

14. WARRANTY

Seller warrants to the original Buyer only that the Products manufactured by Seller shall be free from defects in material or workmanship for a period of ninety (90) days measured from the date of shipment. The foregoing warranty will become void, and Seller will have no obligation whatsoever under this warranty, with respect to any of the following: (i) Products that are not used or maintained in a normal and proper manner, in accordance with any manuals and instructions that might be provided by Seller; (ii) Products that are modified, altered or repaired without the prior written approval of Seller; (iii) Buyer fails to make any payments when due under Section 3 or otherwise in the order or (iv) Products that are assigned, sold or transferred to an entity other than the Buyer. Seller will repair or replace at its option Products which upon Seller's inspection it finds to be defective, based on claims made in writing to Seller by Buyer within a reasonable time after discovery and within the warranty period. Products alleged to be defective must be returned to Seller for repair or replacement, freight prepaid, within thirty (30) days of Buyer's receipt of the return authorization number, obtained from Seller, which must be clearly marked on the outside of the return container. Replacement components shall be shipped from Seller upon Buyer request and receipt of a valid purchase order number so the validity of the Warranty can be determined. Unless otherwise specified, replacement Products shall be Delivered to Buyer "Ex Works Seller's factory" (Incoterms 2000). Any labor or equipment rental costs incurred in the dismantling and reassembly of the equipment into which the Products are installed shall be at Buyer's sole expense. This warranty excludes Products furnished by the Seller but manufactured by another party. Such Products shall bear no warranties other than the warranties extended by and enforceable against the manufacturer thereof at the time of Delivery to Buyer (which warranties Seller will furnish on Buyer's written request), for the period stated in that warranty.

Notwithstanding the foregoing, to the extent that a Product or a component within a Product is deemed by Seller or, in the case of a component, the manufacturer of the component, to be obsolete, such Product or component shall bear no warranty.

THE WARRANTY STATED HEREIN IS PERSONAL TO BUYER AND SELLER MAKES NO OTHER WARRANTIES OR REPRESENTATIONS WITH RESPECT TO THE PRODUCTS FURNISHED HEREUNDER AND DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING

WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ABOVE WARRANTY SHALL CONSTITUTE BUYER'S EXCLUSIVE REMEDY WITH RESPECT TO THE PRODUCTS FURNISHED HEREUNDER.

If Buyer removes or permits anyone to remove any safety equipment or warning signs or fails to observe any condition in this Section 14, or if any injury or damage is caused, in whole or in Product, by the end-user's failure to comply with applicable federal, state or local safety requirements or Seller's instructions as provided in Section 11 above, Seller shall have no obligation to Buyer, and Buyer shall indemnify and hold Seller harmless against any claims, loss or expense for injury or damage arising from the improper use of the Products or the equipment into which the Products are installed. Seller specifically disclaims any and all liability arising out of the operating of the equipment other than the warranty liabilities to the original Buyer.

15. LIMITATION OF LIABILITY

BUYER UNDERSTANDS AND ACKNOWLEDGES THAT SELLER SHALL NOT BE LIABLE FOR ANY SPECIAL, DIRECT, INDIRECT, CONSEQUENTIAL, PUNITIVE OR INCIDENTAL DAMAGES OF ANY KIND, OR LABOR, EXPENSES, LOST PROFITS LOST OPPORTUNITIES, OR SIMILAR DAMAGES OF ANY KIND; AND REGARDLESS OF THE LEGAL THEORY OR CAUSES OF ACTION BY WHICH CLAIMS FOR ANY SUCH DAMAGES AS SET FORTH IN THE ENTIRETY OF THE ABOVE SECTION ARE ADVANCED, WHETHER OR NOT SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF ANY SUCH DAMAGES.

For international transactions:

IN ADDITION TO THE FOREGOING, SELLER MANUFACTURES AND/OR SELLS ITS PRODUCTS IN ACCORDANCE WITH AND NOT INFRINGING ON THE CUSTOMS, SPECIFICATIONS, PATENTS AND STANDARDS OF TRADE IN FORCE AND IN USE AND KNOWN TO SELLER IN THE UNITED STATES OF AMERICA. IT IS THE RESPONSIBILITY OF THE BUYER TO ASSURE THAT THE PRODUCTS AND THE EQUIPMENT INTO WHICH THE PRODUCTS ARE INSTALLED ARE USED IN ACCORDANCE WITH AND NOT INFRINGING UPON THE CUSTOMS, SPECIFICATIONS, PATENTS AND STANDARDS OF TRADE IN FORCE AND IN USE IN THE COUNTRY OF INSTALLATION.

16. INDEMNITY

Buyer agrees to indemnify and hold harmless Seller and its vendors from any and all claims or liabilities asserted against Seller or its vendors in connection with the manufacture, sale, delivery, re-sale, or repair or use of any Product furnished under these governing Terms & Conditions arising in whole or in Product out of or by reason of the failure of Buyer, its agents, servants, employees or customers to follow directions, instructions, warnings or recommendations furnished by Seller or its vendors in connection with such equipment, or by reason of the failure of Buyer, its agents, servants, employees or customers to comply with all federal, state or local laws and regulations applicable to such equipment, including the Occupational Safety and Health Act of 1970, or by reason of the negligence of Buyer, its agents, servants, employees or customers.

17. PURCHASE MONEY SECURITY INTEREST

Notwithstanding any passage of title, Seller reserves a Purchase Money Security Interest under the Uniform Commercial Code in the equipment and in the proceeds derived from such equipment. Buyer shall execute such documents as Seller may require, including, but not limited to, a Security Agreement, one or more Financing Statements, and provide to the Seller signed waivers and consents from landowner(s) and mortgagee(s). The Buyer agrees and hereby does appoint the Seller as attorney in fact to do, at the option of Seller, all acts and things the Seller may deem desirable to perfect and continue to perfect the Purchase Money Security Interest, including Seller's authority to file financing statements naming Buyer as debtor and Seller as secured party without Buyer's signature in those states where such filings are permitted. At the Seller's option, there shall be no Delivery of any of the equipment purchased hereunder until all documents necessary to perfect the Security Interest have been executed to the Seller's satisfaction. All costs and expenses of Seller, including attorneys' fees for the preparation and recordation of documents deemed necessary and appropriate to establish and perfect the Security Interest, shall be the responsibility of the Buyer and shall be immediately payable by the Buyer upon receipt of Seller's invoice for same. These interests shall be satisfied by payment in full of the price.

18. MISCELLANEOUS

These Terms & Conditions supersede and replace any and all prior or contemporaneous agreements, understandings, arrangements or representations, whether oral or written heretofore made between the parties and relating to the subject matter hereof, and constitutes the entire understanding of the parties with respect to the sale of Products by Seller to Buyer. If either party, at its option, agrees to a waiver of any of the terms and conditions recited herein, such waiver shall not for any purpose be construed as a waiver of any succeeding breach of the same or any other terms and conditions; nor shall such a waiver be deemed as a course of conduct. If any provision or clause, or portion thereof, of these Terms & Conditions, or application thereof to any person or circumstances is held invalid or unconscionable, such invalidity or unconscionability shall not affect other provisions, or portions thereof, or applications of these Terms & Conditions which can be given effect without the invalid or unconscionable provision, or portion thereof, or application, and to this end the provisions of these terms and conditions are declared to be severable. Captions and heading in these Terms & Conditions are strictly for the purpose of convenience and general reference only, and shall not affect the meaning or interpretation of any of the provisions herein. Except as required to obtain necessary licenses or governmental approvals, each party shall obtain the written approval (which approval shall not be unreasonably withheld) of the other in advance of the disclosure of any news releases, articles, brochures, advertisements, prepared speeches and other information releases, relating to the subject matter hereof or the work performed or to be performed hereunder.

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STANDARD LIMITED WARRANTY HVAC Equipment

ABI (the "Manufacturer") warrants to the original owner at the original installation site that its HVAC equipment furnished with this Standard Limited Warranty (the "Product") will be free from defects in material or workmanship for a period not to exceed one (1) year from the date of shipment from the factory. If, upon examination by the Manufacturer, the Product is shown to have a defect in material or workmanship during the warranty period, the Manufacturer will repair or replace, at its option, that part of the Product which is shown to be defective.

This limited warranty does not apply:

- (A) if the Product has been subjected to misuse or neglect, has been accidentally or intentionally damaged, has not been installed, maintained or operated in accordance with the furnished written instructions, or has been altered or modified in any way.
- (B) to any expenses, including labor, material or freight, incurred during removal, reinstallation, or shipment of the defective Product or any replacement parts thereof.
- (C) if the performance of the Product has been impaired by use of any other equipment not authorized by the Manufacturer.
- (D) to any workmanship of the installer of the Product.
- (E) to any accessory items or major component parts not manufactured by the Manufacturer. Such items or components will be furnished with the warranty, if any, provided by the original manufacturer.

Repair or replacement of any part under this Limited Warranty shall not extend the duration of the warranty with respect to such repaired or replaced part beyond the stated warranty period.

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ALL SUCH OTHER WARRANTIES, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS LIMITED WARRANTY.

IN NO EVENT SHALL THE MANUFACTURER BE LIABLE IN ANY WAY FOR ANY CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OF ANY NATURE WHATSOEVER, OR FOR ANY AMOUNTS IN EXCESS OF THE SELLING PRICE OF THE PRODUCT OR ANY PARTS THEREOF FOUND TO BE DEFECTIVE. THIS LIMITED WARRANTY GIVES THE ORIGINAL OWNER OF THE PRODUCT SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY BY EACH JURISDICTION.

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KYNAR WARRANTY

Air Balance warrants our KYNAR finish on aluminum for (5) five years. The following are the standards, which will be met:

- A. WILL NOT chalk in excess of ASTM-D-659-80 number eight (8) rating, determined by the procedure outlined in ASTM-D-659-80 specification test.
- B. WILL NOT change color more than five (5.0) Hunter E units as determined by ASTM method D-2244-79.
- C. WILL NOT crack, check, or peel (lose adhesion). But this does not include minute fracturing which may occur in proper fabrication of the building parts.

NOTES ON FIELD REPAIRS AND CLEANING

Air Balance cannot warrant any field painting done to our louvers. For touch-up and minor field repairs, Air Balance can supply small quantities of matching air-dry Kynar on request. For large areas or refinishing the entire louver, Air Balance recommends a good quality oil based semi-gloss enamel, such as Sherwin Williams for a long lasting finish. The surface must be clean and free of dirt or contaminants before any paint is applied to the Kynar surface. You should get good adhesion and the Kynar finish will not be affected by the addition of this topcoat.

WARNING! Do not use Acetone to clean the surface of the Kynar finish or use paints, which may contain Acetone. Also do not use any Lacquer type paints on the surface of the Kynar. **These chemicals may permanently damage the Kynar finish** and VOIDS the warranty.

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Angles, Transitions & Sleeves

Tab-Lock Retaining Angles
Transitions and Collars
Sleeves and Sideplates

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Tab-Lock Retaining Angles

Fire Damper Models: 119, D19, 319, D39, MD19, MA19, MD39, MA39

Fire/Smoke Damper Models: FS, FA, FT, TA

APPLICATION

Tab-Lock Retaining Angles may be used to mount fire dampers or fire/smoke dampers both vertically and horizontally. UL approved for dampers with 1½ and 3 hour fire rating, they offer the flexibility of attachment to the sleeve into the rated barrier. The corner tabs can be bent 90° in either direction before or after attachment to the sleeve, depending on job site preference.

Tab-Lock Retaining Angles are pre-punched for easy attachment to the sleeve. Refer to the appropriate Installation Instruction for details.

NOTES

Material: 16-GA Galvanized Steel

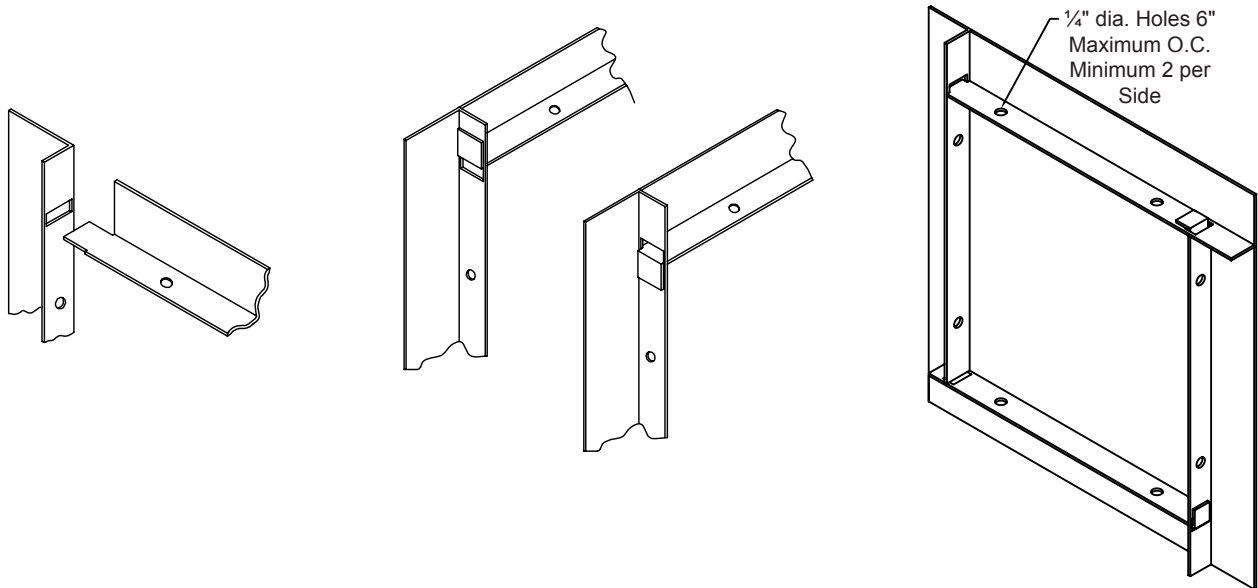
Dimensions: 1½" x 7/8"

Orientation: Vertical or Horizontal

Angles are pre-punched and shipped loose for field attachment to the sleeve. Refer to the appropriate Installation Instructions for details.

This combination fire/smoke and fire damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc.
- ICC's International Building Code
- SMACNA
- National Fire Protection Association Standard 90A



Tab-Lock Retaining Angles

Fire Damper Models: 119, D19, 319, D39, MD19, MA19, MD39, MA39

Fire/Smoke Damper Models: FS, FA, FT, TA

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TRANSITIONS & COLLARS

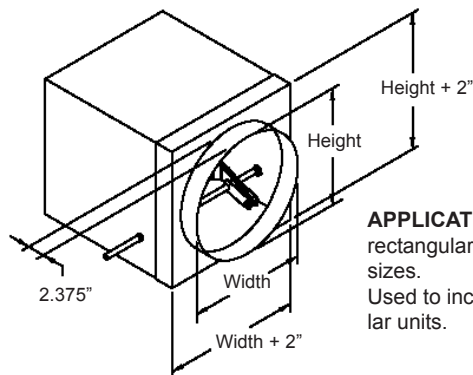
Smoke Damper Models: SR, S, SA

Combination Fire/Smoke Damper Models: FR, FS, FT, FA, TA, FS(G), FS(C)

Fire Damper Models: MD19, MD39, MA19, MA39

Notes

1. A factory provided sleeve is required for the damper to utilize transitions.
2. Transitions can be provided for vertical or horizontal orientations.
3. Transitions can be provided for one or both ends of the damper (one end only for FS(G) and FS(C)).
4. The collar size will be approximately 0.25" smaller than the nominal duct size.



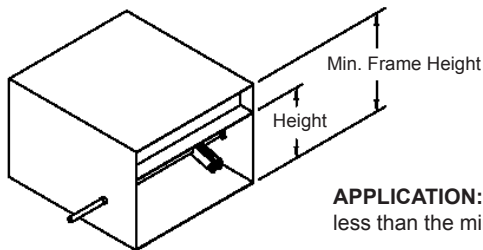
APPLICATION: Used to convert rectangular frame to round or oval duct sizes.
Used to increase free area of rectangular units.

STANDARD MATERIALS AND CONSTRUCTION

TRANSITION CAP: 22-GA galvanized steel attached to damper sleeve and caulked.

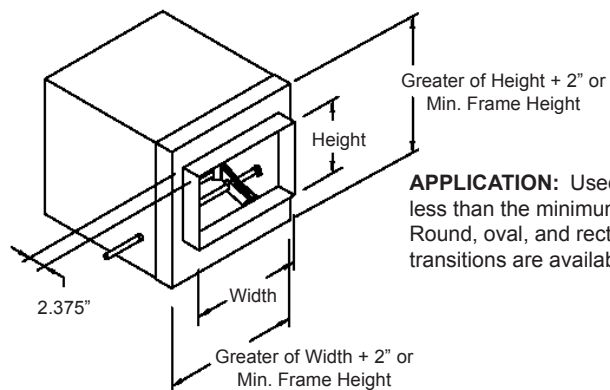
DUCT CONNECTION COLLAR: 24-GA galvanized steel crimped to transition cap and caulked.

*For round duct sizes up to 36" and for oval duct sizes up to 71"W x 30"H, ABI's 24-GA duct connection collar (crimped to the damper transition) constitutes a UL approved duct-to-sleeve "Breakaway" connection, thus allowing a rigid connection collar and the round or oval ductwork.



APPLICATION: Used for dampers less than the minimum frame height.

B-PAN: 24-GA galvanized steel attached to damper sleeve and caulked at each side.



APPLICATION: Used for dampers less than the minimum frame width. Round, oval, and rectangular transitions are available.

TRANSITION CAP: 22-GA galvanized steel attached to damper sleeve and caulked.

DUCT CONNECTION COLLAR: 24-GA galvanized steel crimped to transition cap and caulked.

*Requires breakaway duct to collar connection.

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SLEEVES & SIDEPLATES

Combination Fire/Smoke Damper Models: FS, FT, FA, TA

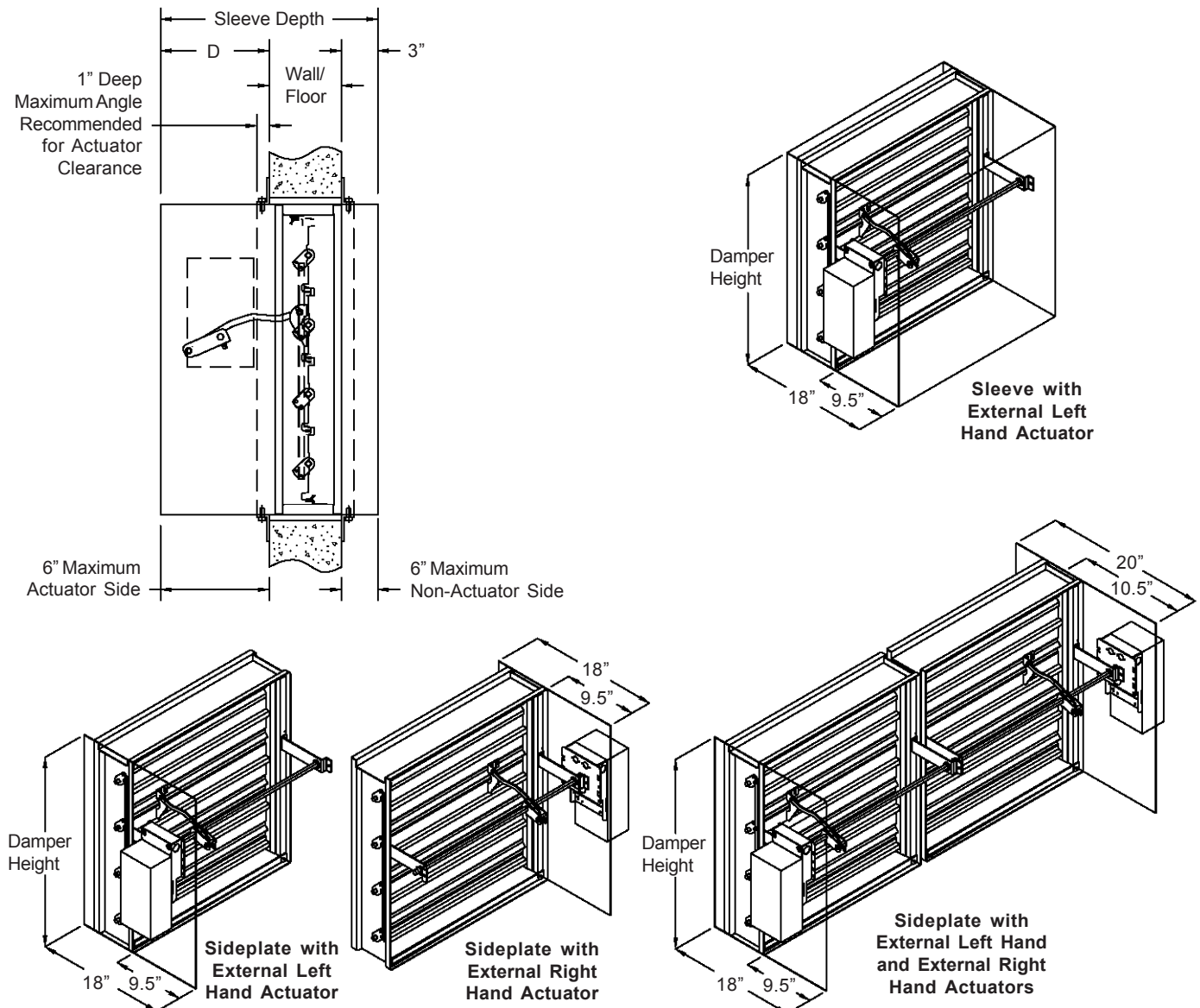
Notes

1. Sleeves are required for the proper installation of fire rated dampers, but need not be factory provided. Reference damper installation instruction for sleeve attachment procedure.
2. Large units that require multiple ship sections will be individually sleeved if sleeve is factory provided.
3. Units with externally mounted actuators require a factory supplied sleeve or sideplate.
4. The standard sleeve is 20-GA x 18" deep (dampers that exceed 84" in width or height require minimum 18-GA sleeve).
5. 10-GA, 12-GA, 14-GA, 16-GA, and 18-GA sleeves are available.
6. Sleeve depths through 48" are available (sleeve distance extending outside of fire barrier must adhere to UL maximums).
7. Refer to Installation Instruction II-FS for sleeve attachment in the field.

Sleeve Depth Determination (for optional mounting in barrier)

The standard sleeve depth allows for an external actuator, 1" retaining angles on both sides of the wall, and 1.5" duct connections on both ends of the sleeve. Sleeve depth and "D" will increase by 1" if a factory-mounted smoke detector is required. A shorter sleeve may be provided and properly installed if internal actuators or one-side retaining angles are utilized, or if the duct connections on one or both ends of the damper are not required. Consult the factory for details.

Standard Sleeve Depth (18") = D (9") + wall/floor thickness (6") + non-actuator side distance (3").



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Severe Weather Louvers

A200 — 2" Deep, Horizontal Blade, Rain Resistant Louver
A220 — 4" Deep, Horizontal Blade, Miami-Dade County Approved
A320 — 6" Deep, Horizontal Blade, Miami-Dade County Approved
A328 — 3" Deep, Vertical Blade, Rain Resistant Louver
A490 — 4" Deep, Horizontal Blade, Rain Resistant Louver
A491 — 4" Deep, Vertical Blade, Rain Resistant Louver
A520 — 5" Deep, Horizontal Blade, Miami-Dade County Approved
A590 — 5" Deep, Horizontal Fixed Blade, Wind Driven Rain
A624 — 6" Deep, Vertical Blade, Rain Resistant Louver
A675 — 6" Deep, Horizontal Blade, Rain Resistant Louver
A680 — 6" Deep, Vertical Blade, Miami-Dade County Approved
A750 — 6" Deep, Horizontal Blade, Wind Driven Rain Louver
A800 — 8" Deep, Vertical Blade, Sand Louver
A820 — 8" Deep, Vertical Blade, Miami-Dade County Approved
A850 — 8" Deep, Horizontal Blade, Rain Resistant Louver
G461 — 4" Deep, Vertical Blade, Galvanized Steel Sand Louver

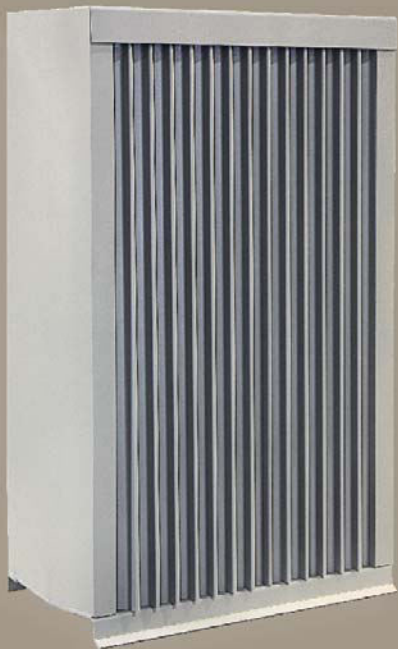
Supplemental Info — Sleeve or Sleeve and Damper
Standard Installation — A220
Standard Installation — A320
Standard Installation — A520
Standard Installation — A680
Standard Installation — A820

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Hurricane Louvers



air balance has developed a complete line of Florida hurricane rated louver products. Our latest product, the A820 meets the requirement for essential facilities applications. The full line of Florida Building Code including High Velocity Hurricane Zones (HVHZ) and Miami-Dade compliant louvers can meet any design requirement.

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Dampers



Louvers

UL Life Safety Products

PO Box 606, 7435 Industrial Rd.
Florence KY 41042
Phone (859) 538-3400 • Fax (859) 647-7810
www.airbalance.com

A820

Patent Pending

Passed following Miami-Dade County protocols:

TAS 100 (Wind Driven Rain Resistance)

TAS 201 (Small and Large Missile Impact)

TAS 202 (Uniform Static Load Test)

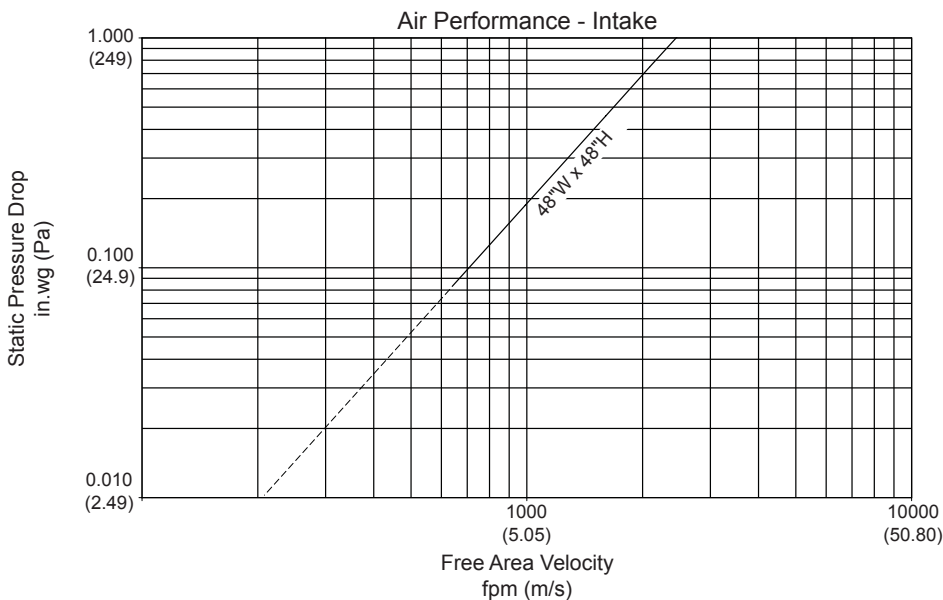
TAS 203 (Cyclic Load Test)

ASTM E1886/1996 Level E

+/-150 PSF

The A820 is the first louver to meet Miami-Dade requirements for wind driven rain elimination without the need for a closed damper.

The 8" deep, A820 is the best design choice for essential facilities where outside air intake to the building must be maintained during a hurricane event. The costly requirement of water proof equipment or separate water containment systems is eliminated. The louver remains open, allowing ventilation while preventing water penetration. This AMCA certified wind driven rain resistant product provides a lower pressure drop than traditional hurricane louver designs.



		Free Area sq.ft. (sq.m)			
		Width			
Height		12 (305)	24 (610)	36 (914)	48 (1219)
	12 (305)	0.10 (0.009)	0.22 (0.021)	0.36 (0.033)	0.49 (0.045)
	24 (610)	0.38 (0.036)	0.88 (0.082)	1.40 (0.130)	1.90 (0.177)
	36 (914)	0.67 (0.062)	1.53 (0.142)	2.45 (0.227)	3.31 (0.308)
	48 (1219)	0.95 (0.088)	2.19 (0.203)	3.49 (0.324)	4.69 (0.435)
	60 (1524)	1.24 (0.115)	2.84 (0.264)	4.54 (0.421)	6.14 (0.571)
	72 (1829)	1.52 (0.141)	3.50 (0.325)	5.58 (0.518)	7.56 (0.702)
	84 (2134)	1.80 (0.168)	4.15 (0.386)	6.62 (0.615)	8.97 (0.833)
	96 (2438)	2.09 (0.194)	4.80 (0.446)	7.67 (0.712)	10.38 (0.965)

Blade Spacing	Rainfall Rate	Wind Velocity	Core Velocity	Air ow	Free Area Veloc-ity	Water Penetra-tion Effectiveness	Discharge Loss Coef-icient
1¼" (31.75 mm)	8 in/hr (203 mm/hr)	50 mph (22 m/s)	970 fpm (4.9 m/s)	10447 cfm (296 m³/min)	2208 fpm (11.2 m/s)	100% - Class A	≤ .199 - Class 4

Wind Driven Rain Performance Test based on 39.37"W x 39.37"H (1m x 1m) Core Area Louver with 3.43 ft² (.319m²) Free Area.

A520

Passed following Miami-Dade County protocols:

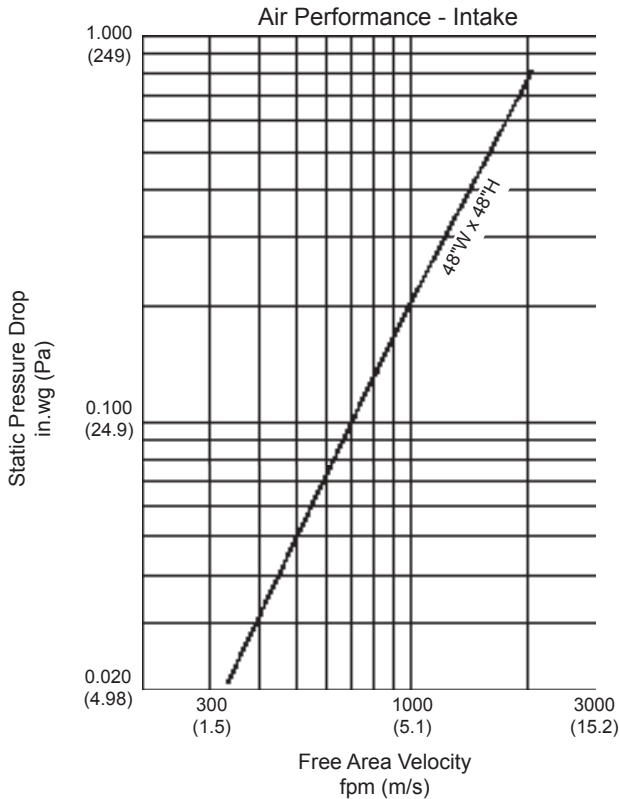
TAS 201 (Small and Large Missile Impact)

TAS 202 (Uniform Static Load Test)

TAS 203 (Cyclic Load Test)

+/-150 PSF

Another AMCA certified wind driven rain resistant louver, the A520, offers a more traditional horizontal blade appearance in a 5" deep frame.



		Free Area sq.ft. (sq.m)				
		Width				
Height		12 (305)	24 (610)	36 (914)	48 (1219)	60 (1524)
	12 (305)	0.21 (0.020)	0.49 (0.046)	0.76 (0.071)	1.04 (0.097)	1.31 (0.122)
	24 (610)	0.63 (0.059)	1.43 (0.133)	2.24 (0.208)	3.04 (0.282)	3.85 (0.358)
	36 (914)	1.04 (0.097)	2.38 (0.221)	3.72 (0.346)	5.05 (0.469)	6.39 (0.594)
	48 (1219)	1.46 (0.136)	3.33 (0.309)	5.19 (0.482)	7.08 (0.658)	8.93 (0.830)
	60 (1524)	1.88 (0.175)	4.27 (0.397)	6.67 (0.620)	9.07 (0.843)	11.47 (1.066)
	72 (1829)	2.29 (0.213)	5.22 (0.485)	8.15 (0.757)	11.08 (1.029)	14.01 (1.302)
	84 (2134)	2.71 (0.252)	6.17 (0.573)	9.63 (0.895)	13.09 (1.216)	16.55 (1.538)
	96 (1438)	3.12 (0.290)	7.11 (0.661)	11.11 (1.032)	15.10 (1.403)	19.09 (1.774)

Blade Spacing	Rainfall Rate	Wind Velocity	Core Velocity	Air ow	Free Area Velocity	Discharge Loss Coef cient
2" (50.8mm)	3 in/hr (76 mm/h)	29 mph (46.7 kph)	980 fpm (5 m/s)	10560 cfm (299 m³/min)	1906 fpm (9.7 m/s)	0.2 - 0.299 - Class 3
2" (50.8mm)	8 in/hr (203 mm/h)	50 mph (80.47 kph)	773 fpm (4 m/s)	8324 cfm (236 m³/min)	1503 cfm (7.6 m/s)	0.2 - 0.299 - Class 3
2" (50.8mm)	8 in/hr (203 mm/h)	50 mph (80.47 kph)	884 fpm (4.5 m/s)	9521 cfm (270 m³/min)	1719 cfm (8.7 m/s)	0.2 - 0.299 - Class 3
2" (50.8mm)	8 in/hr (203 mm/h)	50 mph (80.47 kph)	945 fpm (5 m/s)	10174 cfm (288 m³/min)	1836 cfm (9.3 m/s)	0.2 - 0.299 - Class 3

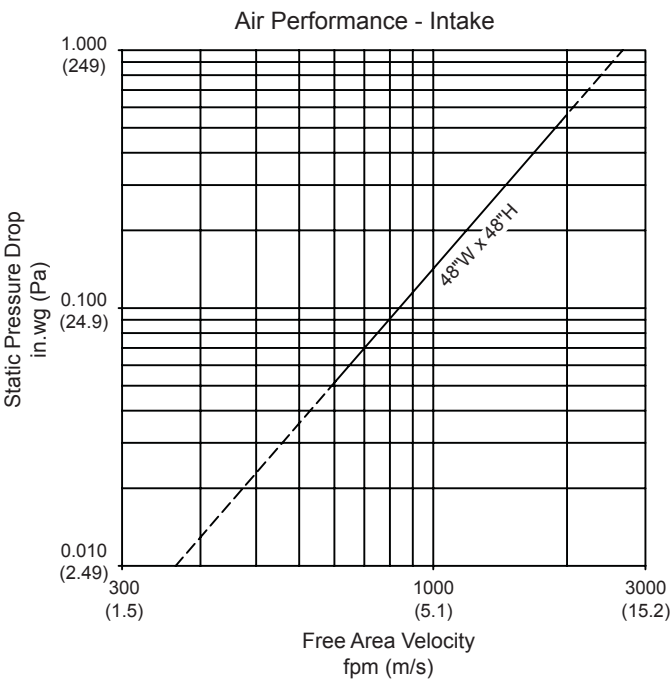
Wind Driven Rain Performance Test based on 39.37"W x 39.37"H (1m x 1m) Core Area Louver with 5.54 ft² (0.515m²) Free Area.

A220

Passed following Miami-Dade County protocols:
TAS 201 (Small and Large Missile Impact)
TAS 202 (Uniform Static Load Test)
TAS 203 (Cyclic Load Test)
+/-150 PSF



The A220 is horizontal blade louver designed to offer the same features and design flexibility as the A320 in a 4" deep frame.

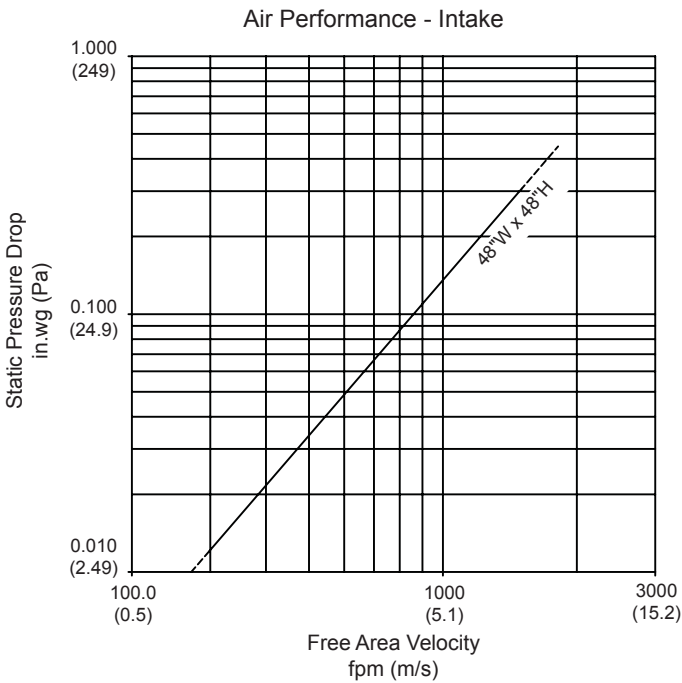


		Free Area sq.ft. (sq.m)				
		Width				
Height		12 (305)	24 (610)	36 (914)	48 (1219)	60 (1524)
	12 (305)	0.31 (0.029)	0.70 (0.065)	1.09 (0.101)	1.48 (0.137)	1.87 (0.174)
	24 (610)	0.81 (0.075)	1.82 (0.169)	2.84 (0.264)	3.86 (0.359)	4.87 (0.452)
	36 (914)	1.3 (0.121)	2.94 (0.273)	4.59 (0.426)	6.23 (0.579)	7.87 (0.731)
	48 (1219)	1.8 (0.167)	4.07 (0.378)	6.34 (0.589)	8.37 (0.778)	10.87 (1.01)
	60 (1524)	2.29 (0.213)	5.19 (0.482)	8.08 (0.751)	10.98 (1.020)	13.88 (1.289)
	72 (1829)	2.79 (0.259)	6.31 (0.586)	9.83 (0.913)	13.35 (1.240)	16.55 (1.538)
	84 (2134)	3.28 (0.305)	7.43 (0.690)	11.58 (1.076)	15.73 (1.461)	19.88 (1.847)
	96 (2438)	3.78 (0.351)	8.55 (0.794)	13.33 (1.238)	18.10 (1.682)	22.88 (2.126)

A320

Passed following Miami-Dade County protocols:
TAS 201 (Small and Large Missile Impact)
TAS 202 (Uniform Static Load Test)
TAS 203 (Cyclic Load Test)
+/-150 PSF

The A320 is our most popular and versatile model. The A320 is offered in different configurations, including screwed, welded, and flanged construction. With a broad array of options, including architectural mullions and special shapes, this 6" deep louver can meet virtually any design criteria.

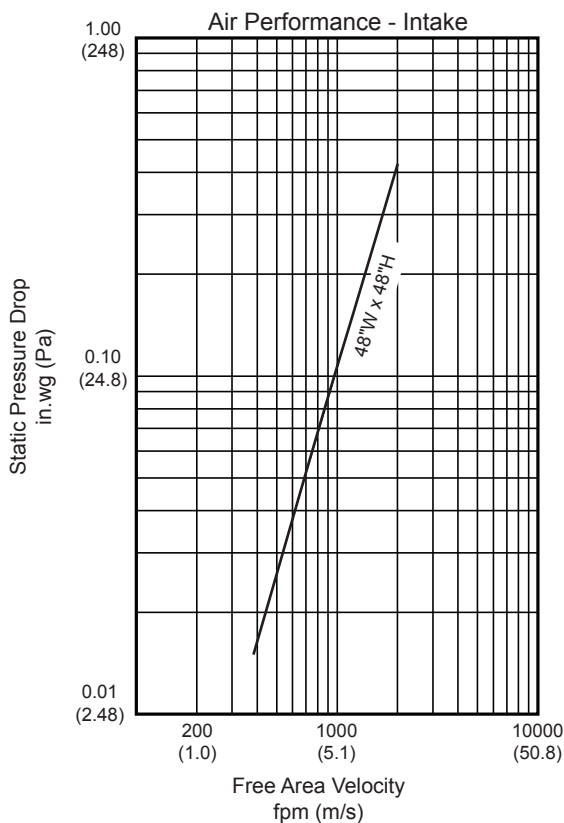


		Free Area sq.ft.(sq.m)							
		Width							
		12	24	36	48	60	72	84	96
		(305)	(610)	(914)	(1219)	(1524)	(1829)	(2134)	(2438)
Height	12	0.18	0.43	0.69	0.94	1.16	1.42	1.67	1.93
	(305)	(0.017)	(0.040)	(0.064)	(0.087)	(0.108)	(0.132)	(0.155)	(0.179)
	24	0.69	1.70	2.70	3.71	4.59	5.59	6.60	7.60
	(610)	(0.064)	(0.158)	(0.251)	(0.345)	(0.426)	(0.519)	(0.613)	(0.706)
	36	1.21	2.96	4.72	6.47	8.01	9.76	11.52	13.27
	(914)	(0.112)	(0.275)	(0.439)	(0.601)	(0.907)	(1.070)	(1.233)	(1.396)
	48	1.72	4.23	6.73	9.24	11.43	13.93	16.44	18.94
	(1219)	(0.160)	(0.393)	(0.625)	(0.858)	(1.062)	(1.295)	(1.527)	(1.760)
Height	60	2.24	5.49	8.75	12.00	14.85	18.11	21.36	24.62
	(1524)	(0.208)	(0.510)	(0.813)	(1.115)	(1.380)	(1.680)	(1.984)	(2.287)
	72	2.75	6.76	10.76	14.77	18.27	22.28	26.28	30.29
	(1829)	(0.255)	(0.628)	(1.000)	(1.372)	(1.697)	(2.070)	(2.441)	(2.814)
	84	3.27	8.02	12.78	17.53	21.69	26.45	31.20	35.96
	(2134)	(0.304)	(0.745)	(1.187)	(1.629)	(2.015)	(2.457)	(2.899)	(3.341)
	96	3.78	9.29	14.79	20.30	25.12	30.62	36.13	41.63
	(2438)	(0.351)	(0.863)	(1.374)	(1.886)	(2.334)	(2.845)	(3.357)	(3.868)

A680

Passed following Miami-Dade County protocols:
 TAS 201 (Small and Large Missile Impact)
 TAS 202 (Uniform Static Load Test)
 TAS 203 (Cyclic Load Test)
 ASTM E1886/1996 Level E
 ASTM E330
 +/-150 PSF

The A680 also has been tested to the AMCA standard for wind driven rain resistance as a Class A louver. The excellent performance characteristics of this 6" louver make it a great choice for preventing rain penetration during typical thunderstorms.



		Free Area sq.ft. (sq.m)							
		Width							
Height		12 (305)	24 (610)	36 (914)	48 (1219)	60 (1524)	72 (1829)	84 (2134)	96 (2438)
	12 (305)	0.28 (0.026)	0.67 (0.062)	1.09 (0.101)	1.52 (0.141)	1.90 (0.177)	2.33 (0.216)	2.71 (0.252)	3.14 (0.292)
	24 (610)	0.67 (0.062)	1.59 (0.148)	2.61 (0.242)	3.63 (0.337)	4.55 (0.423)	5.56 (0.517)	6.48 (0.602)	7.50 (0.697)
	36 (914)	1.07 (0.099)	2.52 (0.234)	4.13 (0.384)	5.74 (0.533)	7.19 (0.668)	8.80 (0.818)	10.25 (0.952)	11.86 (1.102)
	48 (1219)	1.46 (0.136)	3.44 (0.320)	5.65 (0.525)	7.85 (0.729)	9.83 (0.913)	12.04 (1.119)	14.02 (1.303)	16.22 (1.507)
	60 (1524)	1.85 (0.172)	4.37 (0.406)	7.16 (0.665)	9.96 (0.925)	12.48 (1.159)	15.27 (1.419)	17.79 (1.653)	20.59 (1.913)
	72 (1829)	2.24 (0.208)	5.30 (0.492)	8.68 (0.806)	12.07 (1.121)	15.12 (1.405)	18.51 (1.720)	21.56 (2.003)	24.95 (2.318)
	84 (2134)	2.63 (0.244)	6.22 (0.578)	10.20 (0.946)	14.18 (1.317)	17.77 (1.651)	21.75 (2.021)	25.33 (2.353)	29.31 (2.723)
	96 (2438)	3.03 (0.281)	7.15 (0.664)	11.72 (1.089)	16.29 (1.513)	20.41 (1.896)	24.98 (2.321)	29.11 (2.704)	33.68 (3.129)

Blade Spacing	Rainfall Rate	Wind Velocity	Core Velocity	Air Flow	Free Area Velocity	Water Penetration Effectiveness	Discharge Loss Coefficient
2" (50.8 mm)	3 in/hr (76 mm/h)	29 mph (46.7 kph)	980 fpm (5 m/s)	10546 cfm (299 m³/min)	2170 fpm (11 m/s)	100% - Class A	≥ 0.4 - Class 1
2" (50.8 mm)	8 in/hr (203 mm/h)	50 mph (80.47 kph)	784 fpm (4 m/s)	8440 cfm (239 m³/min)	1736 fpm (8.8 m/s)	99.2% - Class A	≥ 0.4 - Class 1
2" (50.8 mm)	8 in/hr (203 mm/h)	50 mph (80.47 kph)	877 fpm (4.5 m/s)	9445 cfm (267 m³/min)	1943 fpm (9.9 m/s)	99.1% - Class A	≥ 0.4 - Class 1
2" (50.8 mm)	8 in/hr (203 mm/h)	50 mph (80.47 kph)	982 fpm (5 m/s)	10578 cfm (300 m³/min)	2176 fpm (11 m/s)	99.1% - Class A	≥ 0.4 - Class 1

Wind Driven Rain Performance Test based on 39.37"W x 39.37"H (1m x 1m) Core Area Louver with 5.88 ft² (0.546m²) Free Area.

A680 & A320 with Damper

Passed following Miami-Dade County protocols:

TAS 100 (Wind Driven Rain Resistance)

TAS 201 (Small and Large Missile Impact)

TAS 202 (Uniform Static Load Test)

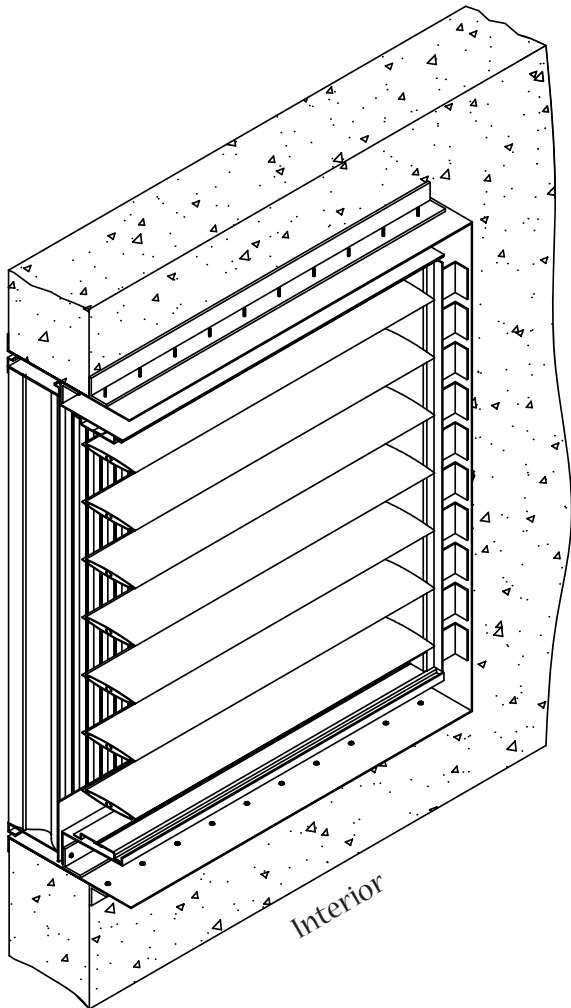
TAS 203 (Cyclic Load Test)

+/-150 PSF

When installed with a rated damper, these louver models are TAS 100 compliant for wind driven rain resistance. The factory supplied, minimum 14" sleeve makes installation fast and easy.



A680 in Sleeve



P320

Passed following Miami-Dade County protocols:

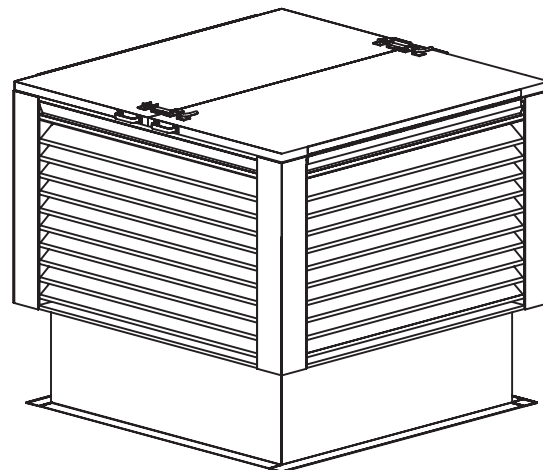
TAS 201 (Small and Large Missile Impact)

TAS 202 (Uniform Static Load Test)

TAS 203 (Cyclic Load Test)

+/- 70 PSF

abi also offers a Miami-Dade County Penthouse. The P320 is used to protect critical rooftop mounted equipment such as fans and ventilators, that must operate during a hurricane. Typical applications include hospitals, schools, nursing homes and storm shelters



air balance inc. is a division of Mestek, Inc. Mestek, Inc. is a family of over 40 specialty manufacturers providing heating, ventilating, and air conditioning products, coil handling equipment, extruded aluminum products, and computer information systems and services.



PO Box 606, 7435 Industrial Rd. • Florence KY 41042 • Phone (859) 538-3400 • Fax (859) 647-7810
www.airbalance.com

MODEL A200

2" Deep • Drainable Blade • Rain Resistant Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .063" thick nominal; 6063-T6/T52 extruded aluminum alloy
BLADES: .063" thick nominal; 6063-T6/T52 extruded aluminum alloy
DRAIN SILL PAN: .060" thick; formed aluminum
ASSEMBLY: Mechanically fastened
SCREEN: ½" x .051" attened aluminum birdscreen
FINISH: Mill

OPTIONS

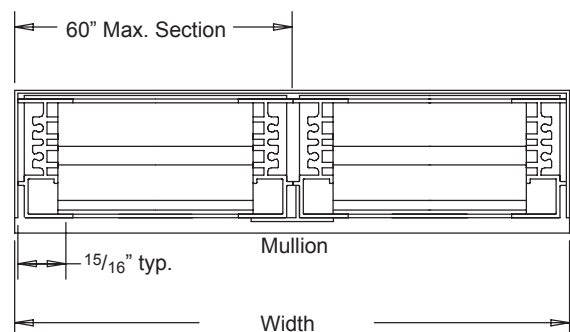
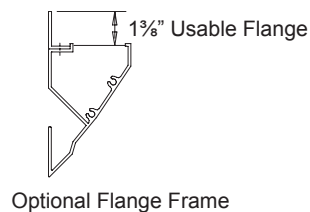
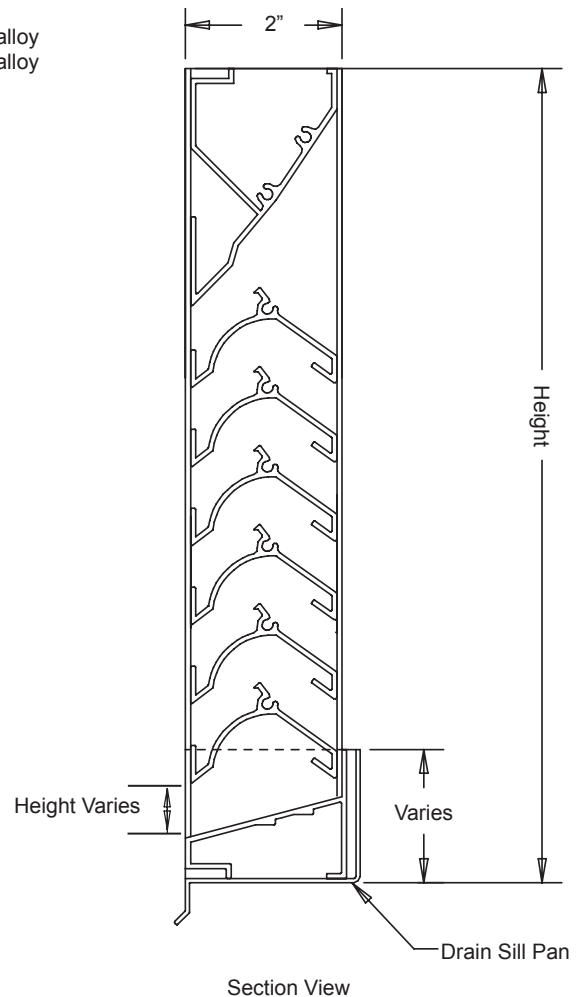
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1½" Usable Flange Frame (Front Face Only)
 Welded Construction
 Blank-off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undercut.
2. Shipping weight approximately 4 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A200	12"W x 12"H	60"W x 96"H



air balance

Dampers  Louvers
 UL Life Safety Products
 Division of Mestek
 Member of AMCA

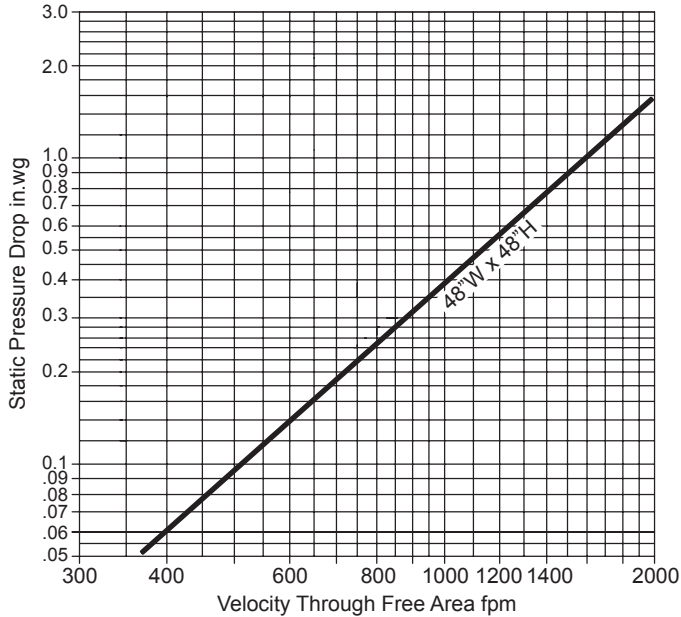
MODEL A200

2" Deep • Drainable Blade • Rain Resistant Extruded Aluminum Louver

Pressure Drop: 0.01 in.wg at 748 fpm and 5408 scfm
 Free Area: 6.93 sq.ft. = 43.3% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.

Intake Pressure Drop



Free Area sq.ft

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.28	0.45	0.62	0.79	0.95	1.12	1.29	1.46	1.62
	24"	0.71	1.13	1.55	1.97	2.39	2.81	3.23	3.65	4.07
	36"	1.14	1.81	2.48	3.15	3.83	4.50	5.17	5.84	6.52
	48"	1.56	2.49	3.41	4.34	5.26	6.19	6.93	8.04	8.96
	60"	1.99	3.17	4.35	5.52	6.70	7.88	9.56	10.23	11.41
	72"	2.42	3.85	5.28	6.71	8.14	9.56	10.99	12.42	13.85
	84"	2.85	4.53	6.21	7.89	9.57	11.25	12.93	14.62	16.30
	96"	3.27	5.21	7.14	9.07	11.01	12.94	14.88	16.81	18.74

Wind Driven Rainwater Penetration Test Conducted to AMCA Standard 500-L-99

Test Size 39.37"W x 39.37"H (1m x 1m) Core Area, Nominal Louver Free Area is 5.24ft²

Core Ventilation (m/s)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	Rainfall/mph
fpm	0	133	212	296	383	491	581	668	3 in/hr Rainfall and 29 mph Velocity
Free Area Ventilation (cfm)	0	1431	2279	3188	4128	5291	6259	7192	
Free Area Velocity (fpm)	-	273	435	608	788	1010	1194	1373	
Effective Rating Class	A	A	A	B	B	C	D	D	
fpm	0	117	195	280	386	461	569	695	8 in/hr Rainfall and 50 mph Velocity
Free Area Ventilation (cfm)	0	1261	2095	3013	4157	4964	6123	7483	
Free Area Velocity (fpm)	-	240	400	575	793	947	1169	1428	
Effective Rating Class	A	A	B	B	B	C	C	D	

Wind Driven Rain Penetration Classifications

Class	Effectiveness %
A	1 - 0.99%
B	0.989 - 0.95%
C	0.949 - 0.80%
D	Below 0.80%

Discharge Coefficient

Intake Cd = 0.19 (Class 4)

Discharge Loss Coefficient Classifications	
Class	Discharge Loss Coefficient
1	0.4 and above
2	0.3 - 0.399
3	0.2 - 0.299
4	0.199 and below

Class I Loss Coefficient has the least
Resistance to Air Flow

1. Core Area is the front opening of a louver assembly with the blades removed.
2. Core Area Velocity is the air flow rate through the louver divided by the core area (39.37" x 39.37")
3. Free Area is the minimum area through which air can pass. It is determined by multiplying the sum of the minimum distances between intermediate blades, top blade and head, bottom blade and sill, by the minimum distance between jambs.
4. Discharge Loss Coefficient is calculated by dividing a louver actual air flow rate vs. a theoretical air flow for the opening, providing an indication of the louver air flow characteristics.



Air Balance certifies that the Model A200 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance and Wind Driven Rain Ratings only.

MODEL A220

4" Deep • Fixed Drainable Blade • Hurricane Louver

STANDARD MATERIALS AND CONSTRUCTION

- HEAD:** .125" thick; extruded 6063-T5 aluminum
SILL: .125" thick; extruded 6063-T5 aluminum
JAMBS: .125" thick; extruded 6063-T5 aluminum
BLADES: .125" thick; extruded 6063-T5 aluminum
ASSEMBLY: Welded and mechanical fastened
FINISH: Mill
SCREEN: 1/2" removable expanded aluminum bird screen located on interior side
MULLIONS: Visible with 1" wide x .08" thick 6063-T5 extruded aluminum cover (multiple panels only)

DESIGN DATA: NOA No: 08-1030.04 - TAS 201, 202, 203

This system has not been tested for water infiltration resistance and is not a water resistant system. This louver system has been designed in accordance with and meet the requirements of the FBC including High Velocity Hurricane Zones (HVHZ).

OPTIONS

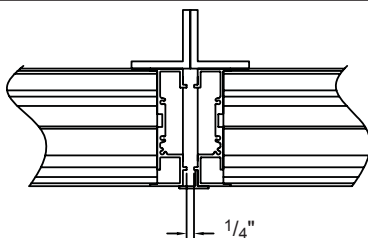
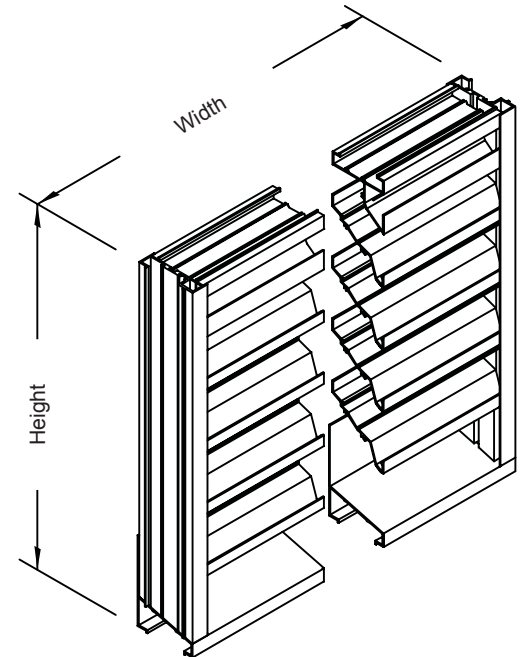
Finishes - Baked Enamel, Kynar, Anodized
 Variety of bird and insect screens
 Extended sill made from formed .063" aluminum
 Flange Frame 1 1/2"W x 1/8" thick
 Architectural Vertical Mullions
 Sill Pan

NOTES

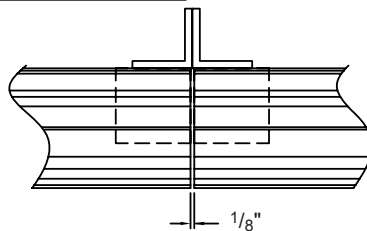
1. "A" width and "B" height are opening dimensions. Louver frames are provided approximately 1/2" undersized.
2. Panels over 30" wide will have a 2" x 2" x 1/4" 6063-T5 aluminum support angle mounted vertically on interior at approximate midpoint.
3. Mullied panels may be horizontally installed to an unlimited number. Vertical stacking of mullied panels may occur providing a structural support is designed and installed by others to support all loads transferred from the louver assembly (single panels may run to unlimited height per elevation if no mullion exists).
4. Approved opening types: wood, steel, or concrete/masonry (masonry acceptable at jambs only, head and sill must be concrete).
5. Units are supplied with mounting angles, structural steel, and mounting hardware for concrete installation as a standard. Please specify if louvers are to be mounted in substrate other than concrete.
6. See installation sketches for required mounting structure.

LOUVER SIZES

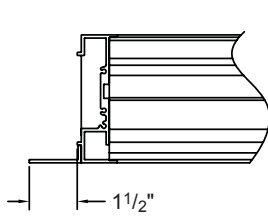
Panels	Minimum Panel	Maximum Single Panel
A220	12"W x 12"H	60"W x 96"H



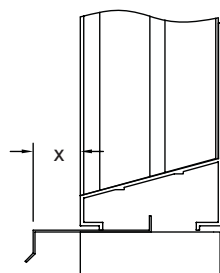
Standard Exposed Vertical Mullion



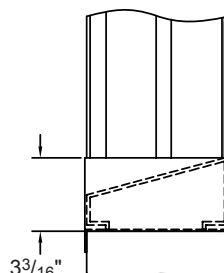
Optional Architectural Vertical Mullion



Optional Flange Frame



Optional Extended Sill Pan



Optional Sill Pan



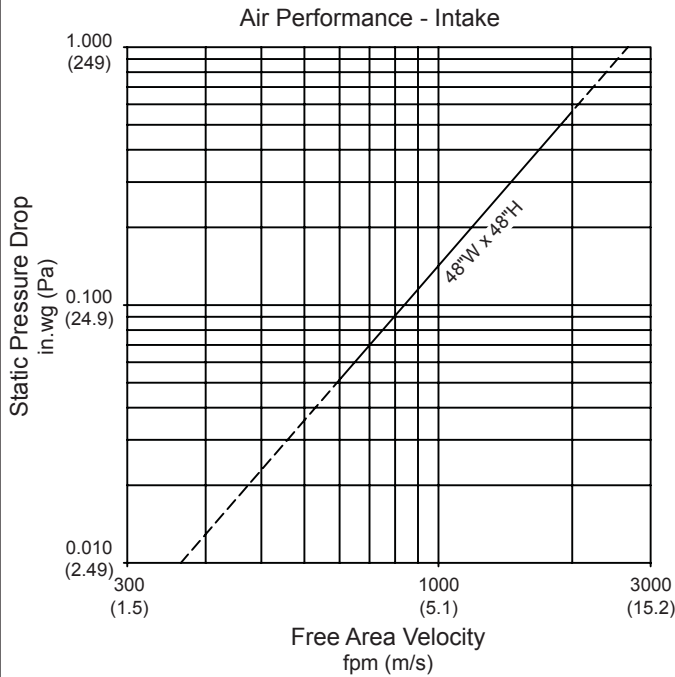
Air Balance Inc. certifies that the model A220 louver shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Water Penetration and Air Performance Ratings only.

MODEL A220

4" Deep • Fixed Drainable Blade • Hurricane Louver

Water Penetration: 0.01 oz. (3.0 g) at 1075 fpm (5.46 m/s) maximum recommended free area velocity**Air Performance:** 0.14 in.wg (34.87 Pa) at 1075 fpm (5.46 m/s) and 8232 SCFM (3.8 scm/s)**Free Area:** 8.37 sq.ft. (0.778) = 52% for 48"W x 48"H (1.22m x 1.22m) test size

1. Test size is 48"W x 48"H (1.2m x 1.2m)
2. Ratings do not include the effect of a screen
3. Data is at standard air density



To determine minimum free area required for louvers:

1. Divide the required flow by the maximum recommended free area velocity.
2. Select the most desirable louver size from the free area table that meets the minimum free area that is required.
3. Compare specified performance to the certified water penetration and air performance ratings.

Example:

Given 15,000 CFM design flow

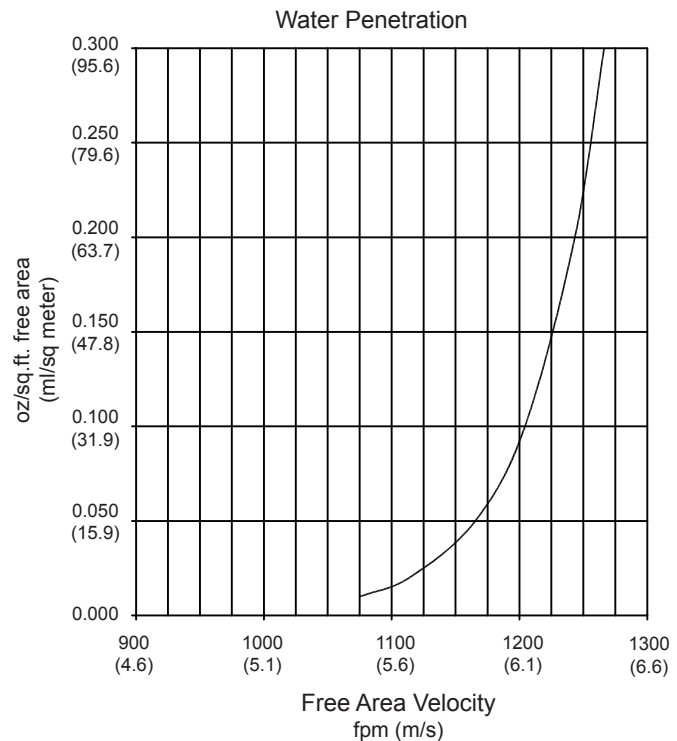
$$1. \text{ minimum free area} = \frac{\text{design flow}}{\text{maximum recommended velocity}}$$

$$\text{minimum free area} = \frac{15,000}{1075} = 13.9 \text{ sq. ft.}$$

2. From the free area table the required louver size is 60"W x 60"H

Free Area in sq.ft (sq.m)

	Width				
	12 (305)	24 (610)	36 (914)	48 (1219)	60 (1524)
Height	12 (305)	0.31 (0.029)	0.70 (0.065)	1.09 (0.101)	1.48 (0.137)
	24 (610)	0.81 (0.075)	1.82 (0.169)	2.84 (0.264)	3.86 (0.359)
	36 (914)	1.3 (0.121)	2.94 (0.273)	4.59 (0.426)	7.87 (0.731)
	48 (1219)	1.8 (0.167)	4.07 (0.378)	6.34 (0.589)	10.87 (1.01)
	60 (1524)	2.29 (0.213)	5.19 (0.482)	8.08 (0.751)	13.88 (1.289)
	72 (1829)	2.79 (0.259)	6.31 (0.586)	9.83 (0.913)	16.55 (1.538)
	84 (2134)	3.28 (0.305)	7.43 (0.690)	11.58 (1.076)	19.88 (1.847)
	96 (2438)	3.78 (0.351)	8.55 (0.794)	13.33 (1.238)	22.88 (2.126)



Both maximum recommended free area velocity and beginning of water penetration are 1075 fpm at standard air (.075 lbs/cu.ft). The above water penetration data is based on mill finish, 48"W x 48"H test size per AMCA Standard 511. (15 minute duration)



Air Balance Inc. certifies that the model A220 louver shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Water Penetration and Air Performance Ratings only.

In the interest of product development, Air Balance reserves the right to make changes without notice.

P.O. Box 606 • 7435 Industrial Rd. • Florence, KY 41042 • Phone: (859) 538-3400 • Fax: (859) 647-7810



MODEL A320

6" Deep • Fixed Drainable Blade • Hurricane Louver

STANDARD MATERIALS AND CONSTRUCTION

- HEAD:** .125" thick; extruded 6063-T5 aluminum
SILL: .125" thick; extruded 6063-T6 aluminum
JAMBS: .125" thick; extruded 6063-T5 aluminum
BLADE: .081" thick; extruded 6063-T5 aluminum
ASSEMBLY: Welded and mechanical fastened
FINISH: Mill
SCREEN: 1/2" removable expanded aluminum bird screen located on interior
MULLIONS: Exposed, vertical with 1 3/4" x .08" 6063-T5 extruded aluminum cover (multiple panels only); Hidden, horizontal
DESIGN DATA: NOA No: 08-1224.01 - TAS 100 with damper in sleeve
 TAS 201, 202, 203 (180 PSF ≥ 36"W; 150 PSF < 36"W)

This system has been tested for water infiltration resistance and is a water resistant system when an AFD20 damper is installed with the louver panel.

NOA No: 08-1030.05 - TAS 201, 202, 203 (150 PSF)

This system has not been tested for water infiltration resistance and is not a water resistant system. This louver system has been designed in accordance with and meet the requirements of the FBC including High Velocity Hurricane Zones (HVHZ).

OPTIONS

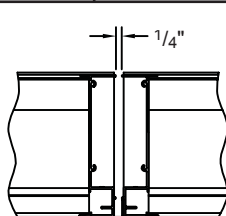
Finishes - Baked Enamel, Kynar, Anodize
 Variety of bird and insect screens
 See Available Option Chart for all other Options

NOTES

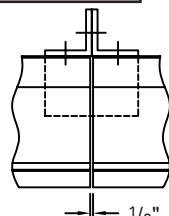
- "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undersize.
- NOA No: 08-1224.01: Panels over 60"W will have a 1 1/2" x 1 1/2" x .125" 6063-T5 support angle mounted vertically on interior at approximately midpoint full length of the louver.
- NOA No: 08-1030.05: Panels over 30"W will have a 1 1/2" x 1 1/2" x .125" 6063-T5 support angle mounted vertically on interior at approximately midpoint full length of the louver.
- Mulled panels may be horizontally installed to an unlimited number. Vertical stacking of mulled panels may occur providing a structural support is designed and installed by others to support all loads transferred from the louver assembly (single panel may run to unlimited height per elevation if no mullion exists).
- Approved opening types: wood, steel, or concrete/masonry (masonry acceptable at jambs only, head and sill must be concrete). Anchoring details may vary.
- Units are supplied with mounting angles, structural steel and mounting hardware for concrete installation as a standard. Please specify if louver are to be mounted in substrate other than concrete.
- See installation sketches for required mounting structure.

LOUVER SIZES

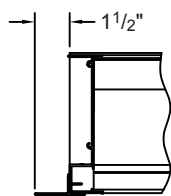
Panels	Minimum Panel	Maximum Single Panel
NOA No: 08-1224.01	12"W x 12"H	96"W x 96"H
NOA No: 08-1030.05	12"W x 12"H	60"W x 96"H



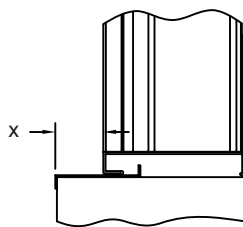
Standard Exposed Vertical Mullion (Available for NOA No: 08-1224.01)



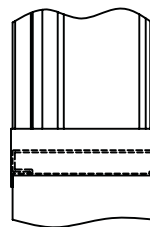
Optional Architectural Vertical Mullion (Available for NOA No: 08-1030.05)



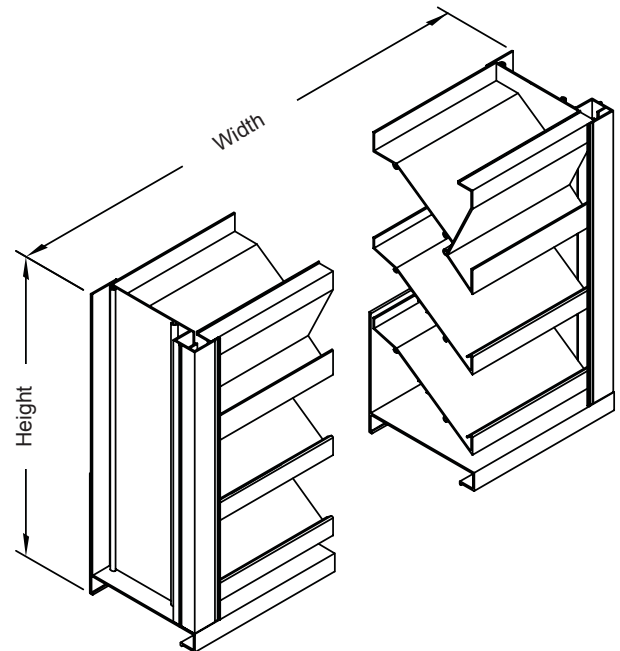
Optional Flange Frame



Optional Extended Sill



Optional Sill Pan



Available Options Chart

	NOA No: 08-1224.01		NOA No: 08-1030.05
Option	Screwed	Welded	w/Structural Steel
.125" Blades	No	Yes	STD*
Architectural Vertical Mullion	No	No	Yes
Welded Construction	No	STD*	STD*
Screwed Construction	Yes	No	No
Flanges 1 1/2"W x 1/8" thick	Yes	Yes	Yes
Extended Sill	Yes	Yes	Yes
Sill Pan	Yes	Yes	STD*†
Sleeve‡	Yes	Yes	No
Sleeve with Damper‡	Yes	Yes	No
Special Shape	No	Yes	No

*STD indicates this feature is standard construction for specified version and no other option is available.

†Sill Pan standard construction for Architectural Vertical Mullion. Optional construction for Visible Vertical Mullion.

‡See SI-SLVHRL-08.11 for more information.



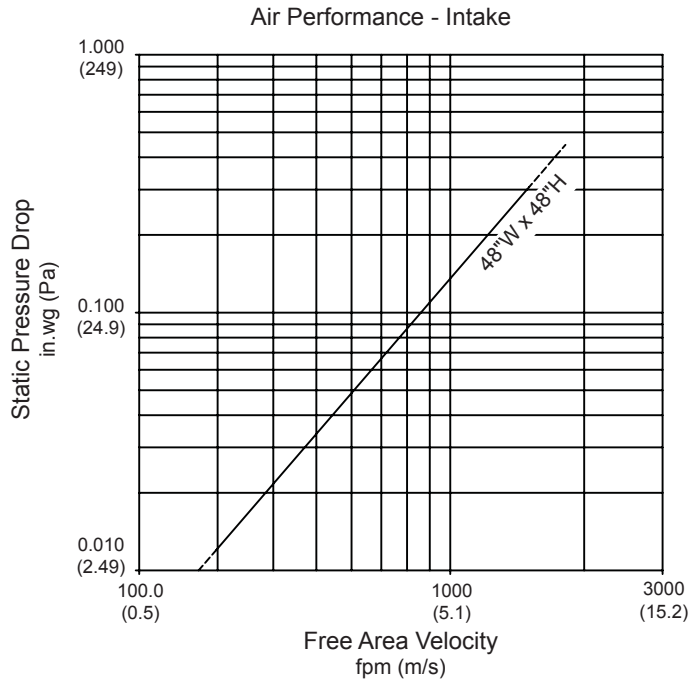
Air Balance Inc. certifies that the model A320 louver shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Water Penetration and Air Performance Ratings only.

MODEL A320

6" Deep • Fixed Drainable Blade • Hurricane Louver

Water Penetration: 0.01 oz. (3.0 g.) at 1250 fpm (6.35 m/s) maximum recommended free area velocity
Air Performance: 0.21 in.wg (52.1 Pa) at 1250 fpm (6.35 m/s) and 11550 SCFM (5.45 scm/s)
Free Area: 9.24 sq.ft. (0.858 sq.m) = 58% for 48"W x 48"H (1.22m x 1.22m) test size

1. Test size is 48"W x 48"H (1.2m x 1.2m).
2. Ratings do not include the effect of a screen.
3. Data is at standard air density (0.75 lbs/cu ft).
4. AMCA Ratings do not apply to special shapes.



Water Penetration
 (15 min duration) Less than .01 oz/sq.ft.
 AMCA standards are based on a maximum of 1250 fpm free area velocity and a minimum of .01 oz/sq.ft. of free area water penetration. The AMCA test was unable to determine the beginning point of water penetration, since it lies above 1250 fpm free area velocity.

To determine minimum free area required for louver:

1. Divide the required flow by the maximum recommended free area velocity.
2. Select the most desirable louver size from the free area table that meets the minimum free area that is required.
3. Compare specified performance to the certified water penetration and air performance ratings.

Example:

Given 15,000 CFM design flow

$$\text{minimum free area} = \frac{\text{design flow}}{\text{max recommended velocity}}$$

$$\text{minimum free area} = \frac{15,000}{1250} = 12.0 \text{ sq.ft.}$$

2. From the free area table, the required louver size is 48"W x 60"H.

Free Area in sq.ft. (sq.m)

		Nominal Width in Inches (mm)							
		12 (305)	24 (610)	36 (914)	48 (1219)	60 (1524)	72 (1829)	84 (2134)	96 (2438)
Nominal Height in Inches (mm)	12 (305)	0.18 (0.017)	0.43 (0.040)	0.69 (0.064)	0.94 (0.087)	1.16 (0.108)	1.42 (0.132)	1.67 (0.155)	1.93 (0.179)
	24 (610)	0.69 (0.064)	1.70 (0.158)	2.70 (0.251)	3.71 (0.345)	4.59 (0.426)	5.59 (0.519)	6.60 (0.613)	7.60 (0.706)
	36 (914)	1.21 (0.112)	2.96 (0.275)	4.72 (0.439)	6.47 (0.601)	8.01 (0.907)	9.76 (0.907)	11.52 (1.070)	13.27 (1.233)
	48 (1219)	1.72 (0.160)	4.23 (0.393)	6.73 (0.625)	9.24 (0.858)	11.43 (1.062)	13.93 (1.295)	16.44 (1.527)	18.94 (1.760)
	60 (1524)	2.24 (0.208)	5.49 (0.510)	8.75 (0.813)	12.00 (1.115)	14.85 (1.380)	18.11 (1.380)	21.36 (1.984)	24.62 (2.287)
	72 (1829)	2.75 (0.255)	6.76 (0.628)	10.76 (1.000)	14.77 (1.372)	18.27 (1.697)	22.28 (2.070)	26.28 (2.441)	30.29 (2.814)
	84 (2134)	3.27 (0.304)	8.02 (0.745)	12.78 (1.187)	17.53 (1.629)	21.69 (2.015)	26.45 (2.457)	31.20 (2.899)	35.96 (3.341)
	96 (2438)	3.78 (0.351)	9.29 (0.863)	14.79 (1.374)	20.30 (1.886)	25.12 (2.334)	30.62 (2.845)	36.13 (3.357)	41.63 (3.868)



Air Balance Inc. certifies that the model A320 louver shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Water Penetration and Air Performance Ratings only.

In the interest of product development, Air Balance reserves the right to make changes without notice.

P.O. Box 606 • 7435 Industrial Rd. • Florence, KY 41042 • Phone: (859) 538-3400 • Fax: (859) 647-7810

MODEL A328

3" Deep • Vertical Blade • Rain Resistant • Extruded Aluminum Storm Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick nominal ; 6063-T6/T52 extruded aluminum alloy
BLADES: .050" thick nominal; 6063-T6/T52 extruded aluminum alloy
BLADE SPACING: .8125"
ASSEMBLY: Mechanically fastened
SCREEN: ½" x .051" attened aluminum birdscreen
FINISH: Mill

OPTIONS

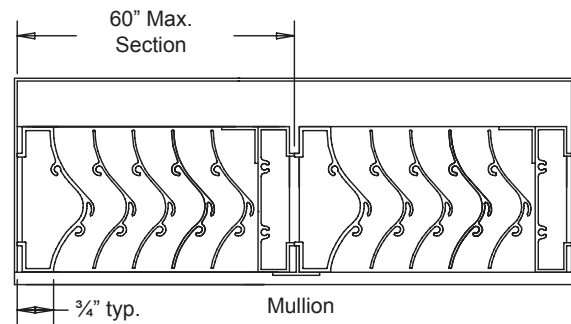
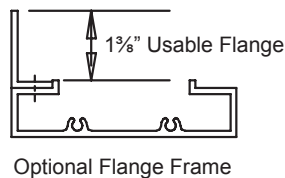
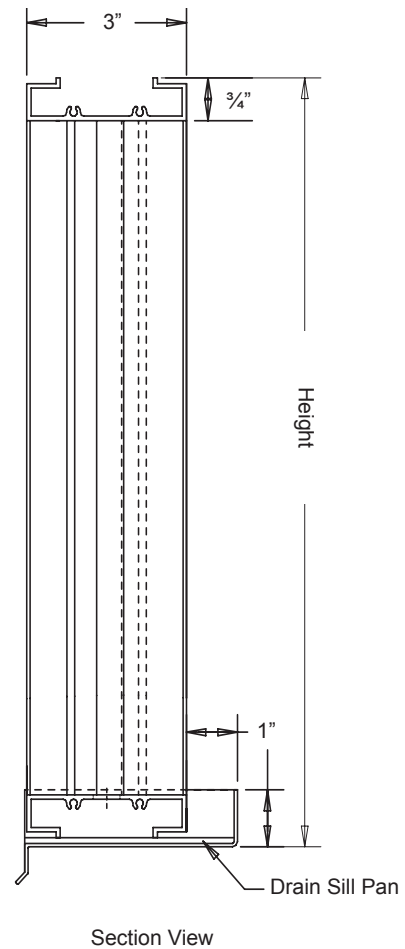
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1½" Usable Flange Frame (3 Sides Only)
 Welded Construction
 Blank-off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undercut.
2. Shipping weight approximately 7 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A328	12"W x 12"H	60"W x 96"H



air balance

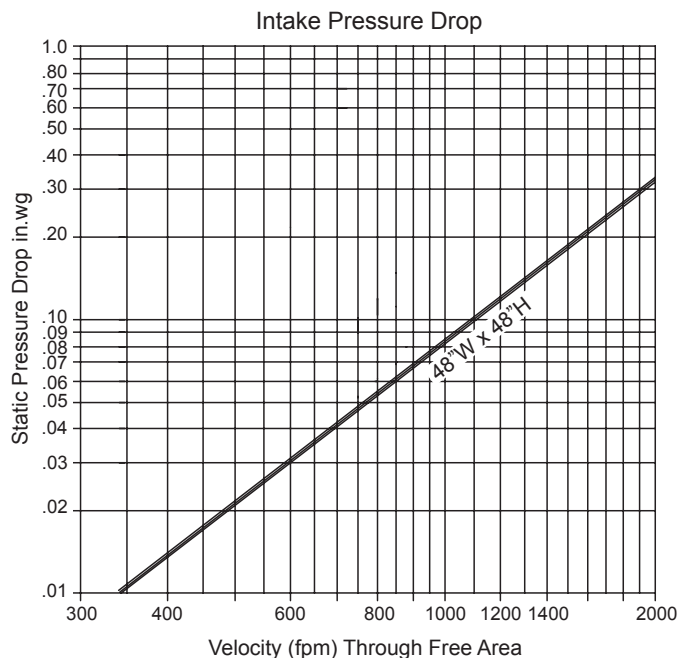
Dampers  Louvers
 UL Life Safety Products
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MODEL A328

3" Deep • Vertical Blade • Rain Resistant • Extruded Aluminum Storm Louver

Pressure Drop: 0.085 in.wg at 1000 fpm and 7,060 scfm
 Free Area: 7.06 sq.ft. = 44% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.



Free Area sq.ft

		Width								
Height		12"	18"	24"	30"	36"	42"	48"	54"	60"
	12"	0.34	0.55	0.76	0.97	1.18	1.39	1.59	1.81	2.02
	24"	0.73	1.18	1.64	2.09	2.53	2.98	3.42	3.89	4.34
	36"	1.12	1.80	2.52	3.21	3.88	4.57	5.24	5.97	6.66
	48"	1.52	2.43	3.40	4.33	5.24	6.17	7.06	8.05	8.98
	60"	1.91	3.06	4.28	5.45	6.59	7.76	8.90	10.13	11.30
	72"	2.30	3.69	5.16	6.57	7.94	9.35	10.72	12.21	13.63
	84"	2.69	4.32	6.04	7.69	9.29	10.95	12.55	14.29	15.95
	96"	3.08	4.95	6.92	8.81	10.65	12.54	14.37	16.38	18.27

Wind Driven Rainwater Penetration Test Conducted to AMCA Standard 500-L-99

Test Size 1m x 1m Core Area, Nominal Louver Free Area 5.11sq.ft

Wind Velocity	Rainfall Rate	Core Area Velocity	Air Flow	Free Area Velocity	Effectiveness Ratio	Class	Discharge Loss Coefficient Class Intake
29 mph	3 in/hr	689 fpm	7415 cfm	1451 fpm	100%	A	I
50 mph	8 in/hr	683 fpm	7352 cfm	1439 fpm	99.5%	A	I

Wind Driven Rain Penetration Classifications

Class	Effectiveness %
A	1 - 0.99%
B	0.989 - 0.95%
C	0.949 - 0.80%
D	Below 0.80%

Discharge Loss Coefficient Classifications

Class	Discharge Loss Coefficient
1	0.4 and Above
2	0.3 - 0.399
3	0.20 - 0.299
4	0.199 and Below

Class 1 Loss Coefficient has the least resistance to air flow.

1. Core Area is the front opening of a louver assembly with the blades removed.
2. Core Area Velocity is the air flow rate through the louver divided by the core area (39.37" x 39.37").
3. Free Area is the minimum area through which air can pass. It is determined by multiplying the sum of the minimum distances between intermediate blades, top blade and head, bottom blade and sill, by the minimum distance between jambs.
4. Discharge Loss Coefficient is calculated by dividing a louver actual air flow rate vs. a theoretical air flow for the opening. Providing an indication of the louver air flow characteristics.



ABI certifies that the Model A328 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Wind Drive Rain Ratings.

air balance

Dampers  Louvers
 UL Life Safety Products
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MODEL A490

4" Deep • Horizontal Drainable Blade • Rain Resistant Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .080" thick; 6063-T6/T52 extruded aluminum alloy
BLADES: .080" thick; 6063-T6/T52 extruded aluminum alloy
DRAIN SILL PAN: .060" thick; formed aluminum
ASSEMBLY: Mechanically fastened
SCREEN: ½" x .051" attened aluminum birdscreen
FINISH: Mill

OPTIONS

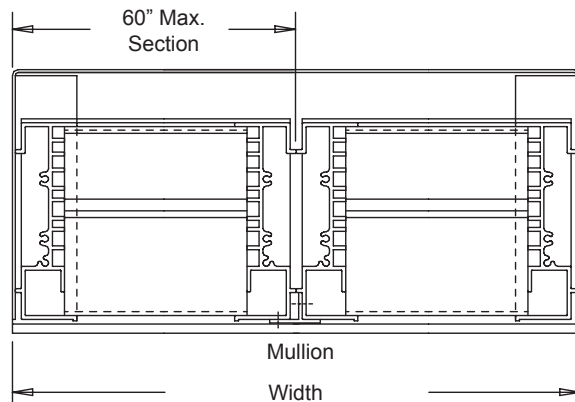
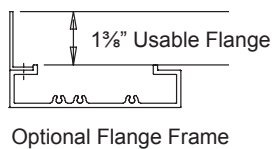
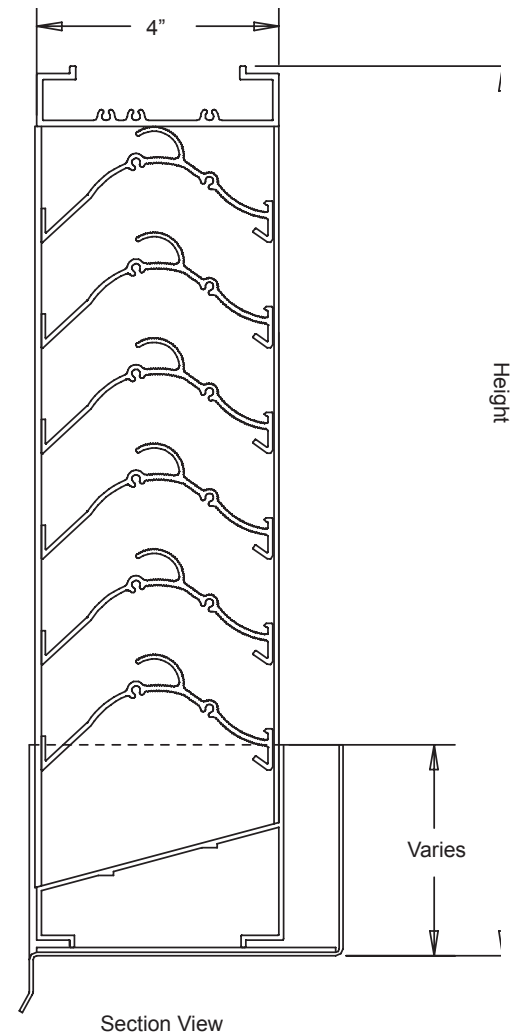
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1⅝" Usable Flange Frame (Front Face Only)
 Welded Construction
 Blank-off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided ¼" undercut.
2. Shipping weight approximately 5.5 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A490	12"W x 12"H	60"W x 96"H



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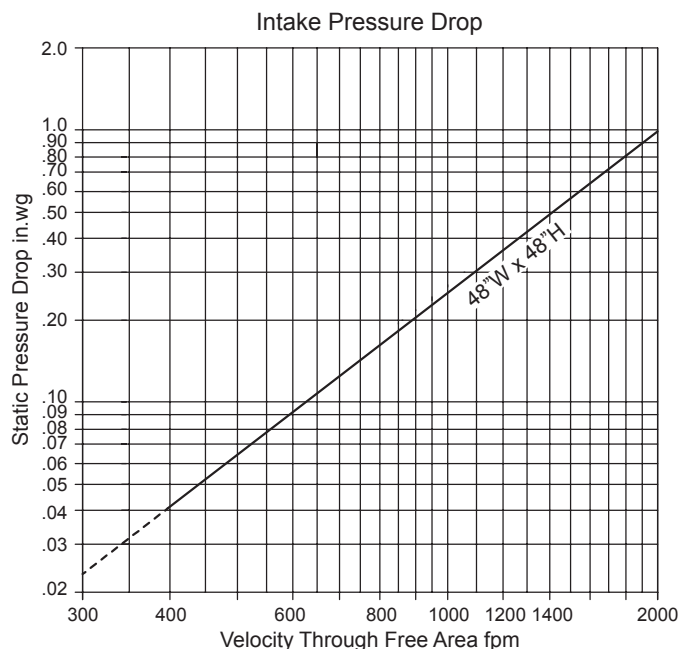
MODEL A490

4" Deep • Horizontal Drainable Blade • Rain Resistant Extruded Aluminum Louver

Pressure Drop: 0.26 in.wg at 1000 fpm

Free Area: 7.50 sq.ft. = 47% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.



Free Area sq.ft										
		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.20	0.33	0.46	0.59	0.72	0.85	0.98	1.11	1.24
	24"	0.73	1.19	1.66	2.12	2.59	3.05	3.52	3.98	4.45
	36"	1.19	1.94	2.70	3.46	4.22	4.98	5.74	6.50	7.26
	48"	1.71	2.80	3.90	4.99	6.09	7.18	7.50	9.37	10.46
	60"	2.17	3.56	4.95	6.33	7.72	9.11	10.50	11.89	13.27
	72"	2.63	4.31	5.99	7.67	9.36	11.04	12.72	14.40	16.08
	84"	3.15	5.17	7.19	9.21	11.22	13.24	15.26	17.27	19.29
	96"	3.61	5.92	8.23	10.55	12.86	15.17	17.48	19.79	22.10

Discharge Coef cient
Intake Cd = 0.25 (Class 3)

Wind Driven Rainwater Penetration Test Conducted to AMCA Standard 500-L-99

Test Size 39.37"W x 39.37"H (1m x 1m) Core Area, Nominal Louver Free Area is 5.24ft ²									
Core Ventilation (m/s)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	Rainfall/mph
fpm	0	98	197	295	394	492	578	666	3 in/hr Rainfall and 29 mph Velocity
Free Area Ventilation (cfm)						5302	6220	7174	
Free Area Velocity (fpm)						962	1129	1302	
Effective Rating Class	A	A	A	A	A	A	A	A	
fpm	0	102	198	282	381	468	564	690	8 in/hr Rainfall and 50 mph Velocity
Free Area Ventilation (cfm)	0	1100	2129	3041	4105	5041	6071	7433	
Free Area Velocity(fpm)	0	200	386	552	745	915	1102	1349	
Effective Rating Class	B	B	B	B	B	B	B	C	

Wind Driven Rain Penetration Classifications

Class	Effectiveness %
A	1 - 0.99%
B	0.989 - 0.95%
C	0.949 - 0.80%
D	Below 0.80%

Discharge Loss Coef cient Classifications

Class	Discharge Loss Coef cient
1	0.4 and above
2	0.3 - 0.399
3	0.2 - 0.299
4	0.199 and below

Class I Loss Coef cient has the least
Resistance to Air ow

1. Core Area is the front opening of a louver assembly with the blades removed.
2. Core Area Velocity is the air ow rate through the louver divided by the core area (39.37" x 39.37")
3. Free Area is the minimum area through which air can pass. It is determined by multiplying the sum of the minimum distances between intermediate blades, top blade and head, bottom blade and sill, by the minimum distance between jambs.
4. Discharge Loss Coef cient is calculated by dividing a louver actual air ow rate vs. a theoretical air ow for the opening, providing an indication of the louver air ow characteristics.



Air Balance certifies that the Model A490 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Wind Driven Rain Penetration Ratings.

MODEL A491

4" Deep • Drainable Vertical Blade • Rain Resistant Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .080" thick; 6063-T6/T52 extruded aluminum alloy
BLADES: .080" thick; 6063-T6/T52 extruded aluminum alloy
DRAIN SILL PAN: .060" thick; formed aluminum
ASSEMBLY: Mechanically fastened
SCREEN: ½" x .051" attened aluminum birdscreen
FINISH: Mill

OPTIONS

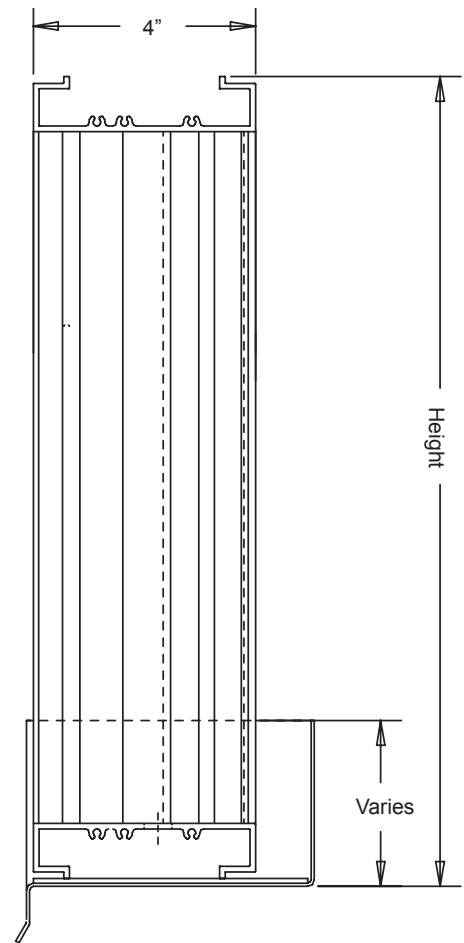
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1⅝" Usable Flange Frame (Front Face Only)
 Welded Construction
 Blank-off Panels

NOTES

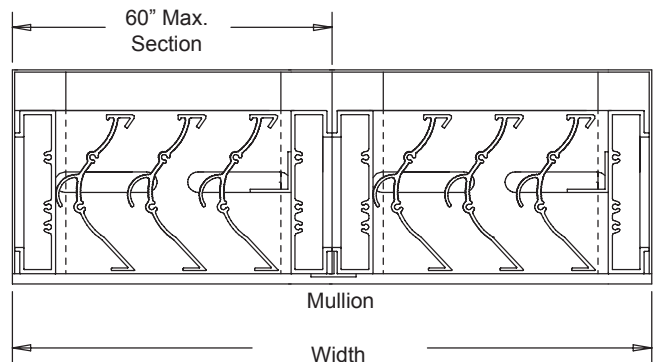
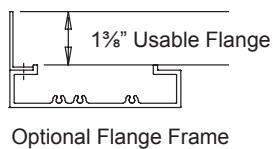
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undercut.
2. Shipping weight approximately 5.5 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A491	12"W x 12"H	60"W x 96"H



Section View



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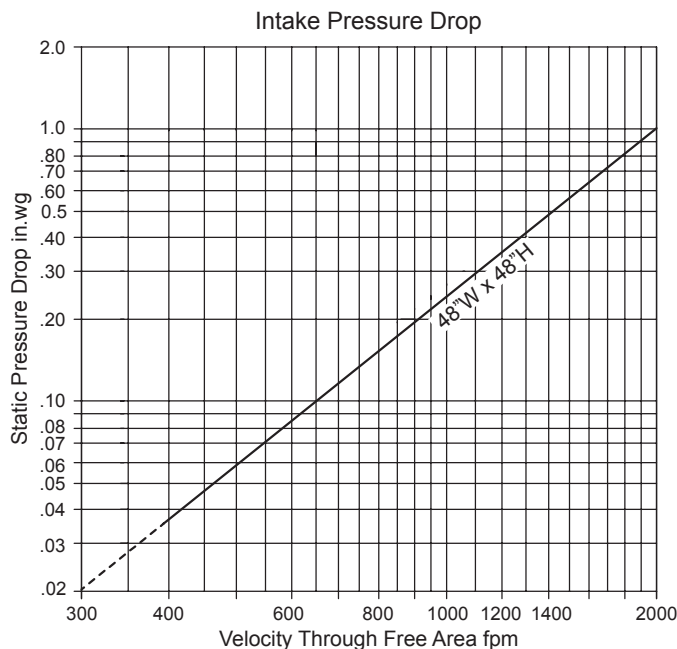
MODEL A491

4" Deep • Drainable Vertical Blade • Rain Resistant Extruded Aluminum Louver

Pressure Drop: 0.26 in.wg at 1000 fpm

Free Area: 7.58 sq.ft. = 47% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.



Free Area sq.ft										
		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.33	0.56	0.78	0.99	1.25	1.48	1.69	1.94	2.17
	24"	0.74	1.24	1.73	2.21	2.77	3.27	3.75	4.31	4.82
	36"	1.15	1.91	2.68	3.42	4.29	5.07	5.81	6.67	7.46
	48"	1.55	2.59	3.63	4.63	5.81	6.87	7.58	9.04	10.11
	60"	1.96	3.27	4.58	5.84	7.33	8.67	9.93	11.40	12.75
	72"	2.36	3.95	5.53	7.05	8.85	10.47	11.99	13.76	15.40
	84"	2.77	4.63	6.48	8.26	10.37	12.26	14.05	16.13	18.04
	96"	3.18	5.30	7.44	9.47	11.89	14.06	16.11	18.49	20.69

Discharge Coef. cient
Intake Cd = 0.26 (Class 3)

Wind Driven Rainwater Penetration Test Conducted to AMCA Standard 500-L-99

Test Size 39.37"W x 39.37"H (1m x 1m) Core Area, Nominal Louver Free Area is 5.24ft ²												
Core Ventilation (m/s)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	Rainfall/mph
fpm	0	98	197	295	394	492	591	689	787	886	985	3 in/hr Rainfall and 29 mph Velocity
Free Area Ventilation (cfm)											10603	
Free Area Velocity (fpm)											1844	
Effective Rating Class	A	A	A	A	A	A	A	A	A	A	A	
fpm									797	883	982	8 in/hr Rainfall and 50 mph Velocity
Free Area Ventilation (cfm)									8572	9503	10563	
Free Area Velocity (fpm)									1491	1653	1837	
Effective Rating Class	A	A	A	A	A	A	A	A	A	A	A	

Wind Driven Rain Penetration Classifications	
Class	Effectiveness %
A	1 - 0.99%
B	0.989 - 0.95%
C	0.949 - 0.80%
D	Below 0.80%

Discharge Loss Coef. cient Classifications	
Class	Discharge Loss Coef. cient
1	0.4 and above
2	0.3 - 0.399
3	0.2 - 0.299
4	0.199 and below

Class I Loss Coef. cient has the least
Resistance to Air ow

1. Core Area is the front opening of a louver assembly with the blades removed.
2. Core Area Velocity is the air ow rate through the louver divided by the core area (39.37" x 39.37")
3. Free Area is the minimum area through which air can pass. It is determined by multiplying the sum of the minimum distances between intermediate blades, top blade and head, bottom blade and sill, by the minimum distance between jambs.
4. Discharge Loss Coef. cient is calculated by dividing a louver actual air ow rate vs. a theoretical air ow for the opening, providing an indication of the louver air ow characteristics.



ABI certifies that the Model A491 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Wind Driven Rain Penetration Ratings.

MODEL A520

5" Deep • Fixed Chevron Drainable Blade • Hurricane Louver

STANDARD MATERIALS AND CONSTRUCTION

HEAD: .08" thick; extruded 6063-T5 aluminum

SILL: .08" thick; extruded 6063-T5 aluminum

JAMBS: .08" thick; extruded 6063-T5 aluminum

BLADES: .060" thick; extruded 6063-T5 aluminum

BLADE SPACING: 2"

ASSEMBLY: Welded and Mechanical fastened

FINISH: Mill

SCREEN: ½ removable expanded aluminum bird screen

MULLIONS: Exposed, vertical with 1¼" x .08" 6063-T5 extruded aluminum cover (multiple panels only) Exposed, horizontal with .08" sill pan (single panel wide only)

DESIGN DATA: NOA 09-1015.11 - TAS 201, 202, 203

This system has not been tested for water infiltration resistance and is not a water resistant system.

OPTIONS

Finishes - Baked Enamel, Kynar, Anodize

Variety of bird and insect screens

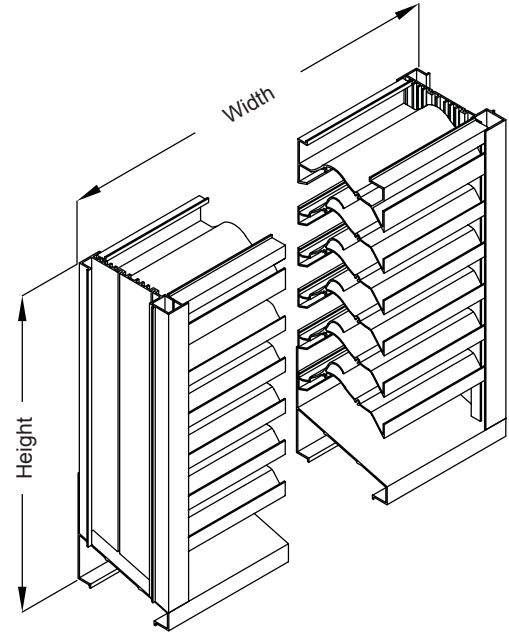
Sill Pan

Blade .081" thick; extruded 6063-T5

Flange Frame

Sleeve

Sleeve with Damper

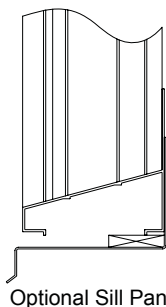
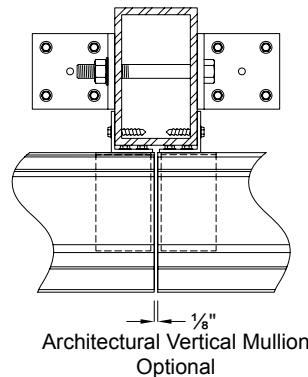
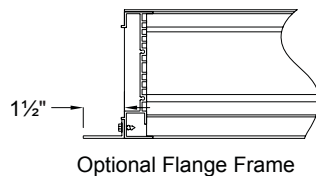
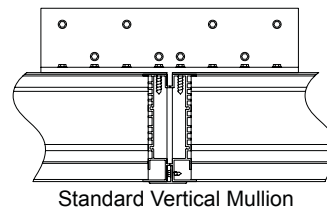


NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undersize.
2. Approved opening types: wood, steel, or concrete/masonry (masonry acceptable at jambs only, head and sill must be concrete). Anchoring details may vary.
3. Units are supplied with 2" x 2" mounting angles and mounting hardware for concrete installation as a standard. Please specify if louvers are to be mounted in substrate other than concrete, OR if the installation will require a larger mounting angle. Larger mounting angles may be required to either maintain edge distance, or to ensure that the screws don't penetrate the sill pan of the louver.
4. See installation sketches for required mounting structure.

LOUVER SIZES

Panels	Minimum Panel	Maximum Single Panel
A520	12"W x 12"H	60"W x 96"H



Air Balance Inc. certifies that the model A520 louver shown herein is licensed to bear the AMCA Seal. The ratings shown are passed on test and procedures performed in accordance with AMCA Publication 511 and comply with the requirements for AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Water Penetration and Air Performance Ratings only.

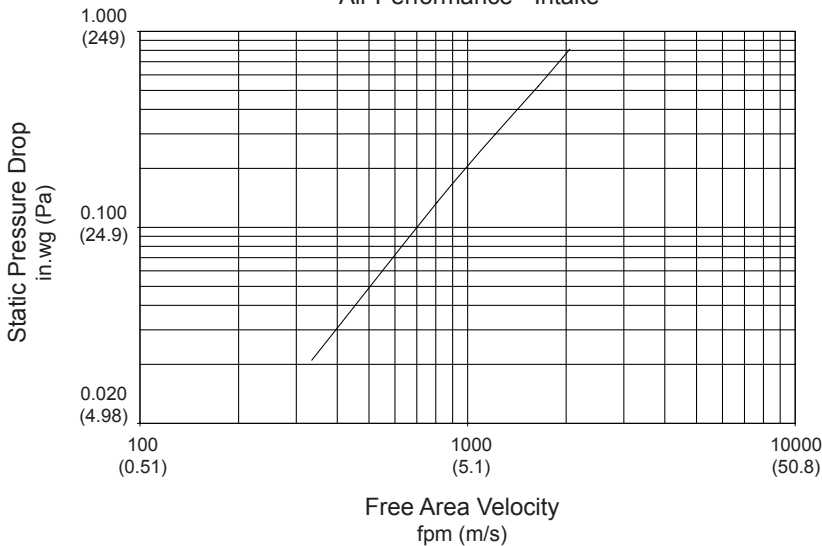
MODEL A520

5" Deep • Fixed Chevron Dranable Blade • Hurricane Louver

Water Penetration: 0.01 oz. (3.0 g) at 1250 fpm (6.35 m/s) maximum recommended free area velocity**Pressure Drop:** 0.31 in.wg (76.8 Pa) at 1250 fpm (6.35 m/s) and 8850 scfm (4.18 scm/s)**Free Area:** 7.08 sq.ft (0.658 sq.m) = 44.3% for 48"W x 48"H (1.22m x 1.22m) test size

1. Test size is 48"W x 48"H (1.2m x 1.2m).
2. Ratings do not include the effect of a screen.
3. Data is at standard air density (0.75 lbs/cu ft).

Air Performance - Intake



Free Area in sq.ft. (sq.m.)

Height		Width				
		12 (305)	24 (610)	36 (914)	48 (1219)	60 (1524)
	12 (305)	0.21 (0.020)	0.49 (0.046)	0.76 (0.071)	1.04 (0.097)	1.31 (0.122)
	24 (610)	0.63 (0.059)	1.43 (0.133)	2.24 (0.208)	3.04 (0.282)	3.85 (0.358)
	36 (914)	1.04 (0.097)	2.38 (0.221)	3.72 (0.346)	5.05 (0.469)	6.39 (0.594)
	48 (1219)	1.46 (0.136)	3.33 (0.309)	5.19 (0.482)	7.08 (0.658)	8.93 (0.830)
	60 (1524)	1.88 (0.175)	4.27 (0.397)	6.67 (0.620)	9.07 (0.843)	11.47 (1.066)
	72 (1829)	2.29 (0.213)	5.22 (0.485)	8.15 (0.757)	11.08 (1.029)	14.01 (1.302)
	84 (2134)	2.71 (0.252)	6.17 (0.573)	9.63 (0.895)	13.09 (1.216)	16.55 (1.538)
	96 (1438)	3.12 (0.290)	7.11 (0.661)	11.11 (1.032)	15.10 (1.403)	19.09 (1.774)

Rainfall Rate	Wind Velocity	Core Velocity	Air ow	Free Area Velocity	Water Penetration Effectiveness	Discharge Loss Coef cient
3 in/hr (76 mm/h)	29 mph (46.7 kph)	583 fpm (3 m/s)	6276 cfm (3 cm/s)	1133 fpm (5.8 m/s)	99.0% - Class A	0.2 - 0.299 - Class 3
8 in/hr (203 mm/h)	50 mph (80.47 kph)	673 fpm (3.5 m/s)	7243 cfm (3 cm/s)	1307 cfm (6.68 m/s)	95.7% - Class B	0.2 - 0.299 - Class 3

Wind Driven Rain Performance Test based on 39.37"W x 39.37"H (1m x 1m) Core Area Louver with 3.43 ft² (.319m²) Free Area.

Wind-Driven Rain Penetration Classes		Discharge Loss Coef cient Classes	
Class	Effectiveness	Class	Coef cient
A	100% - 99%	1	0.4 and Above
B	98.9% - 95%	2	0.3 - 0.399
C	94.9% - 80%	3	0.2 - 0.299
D	Below 80%	4	0.199 and Below

1. Core Area is the front opening of a louver assembly with the blades removed.
2. Core Area Velocity is the air ow rate through the louver divided by the core area (39.37" x 39.37")
3. Free Area is the minimum area through which air can pass. It is determined by multiplying the sum of the minimum distances between intermediate blades, top blade and head, bottom blade and sill, by the minimum distance between jambs.
4. Discharge Loss Coef cient is calculated by dividing a louver actual air ow rate vs. a theoretical air ow for the opening, providing an indication of the louver air ow characteristics.

Water Penetration

(15 Minute Duration) Less than .01 oz/sq.ft. AMCA Standards are based on maximum of 1250 fpm free area velocity and a minimum of .01 oz/sq.ft. free area of water penetration. The AMCA test was unable to determine the beginning water penetration due to the fact that it lies above 1250 fpm through free area.



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MODEL A590

5" Deep • Chevron Drainable Blade • Sightproof • Wind Drive Rain Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

EXTERIOR FRAME: .081" thick; 6063-T6/T52 extruded aluminum alloy

BLADES: .060" thick; 6063-T6/T52 extruded aluminum alloy

ASSEMBLY: Mechanically fastened

SCREEN: 1/2" x .051" flattened aluminum birdscreen

FINISH: Mill

OPTIONS

Finish - Baked Enamel, Kynar, or Anodize

Variety of Bird and Insect Screen

1 3/8" Usable Flange Frame (3 Sides Only, Not on Sill)

Welded Construction

Blank-off Panels

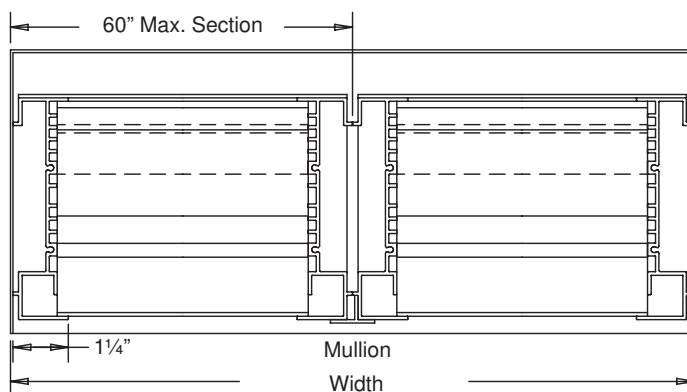
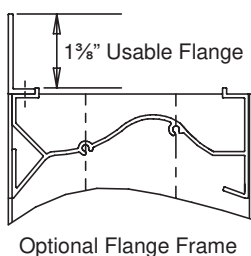
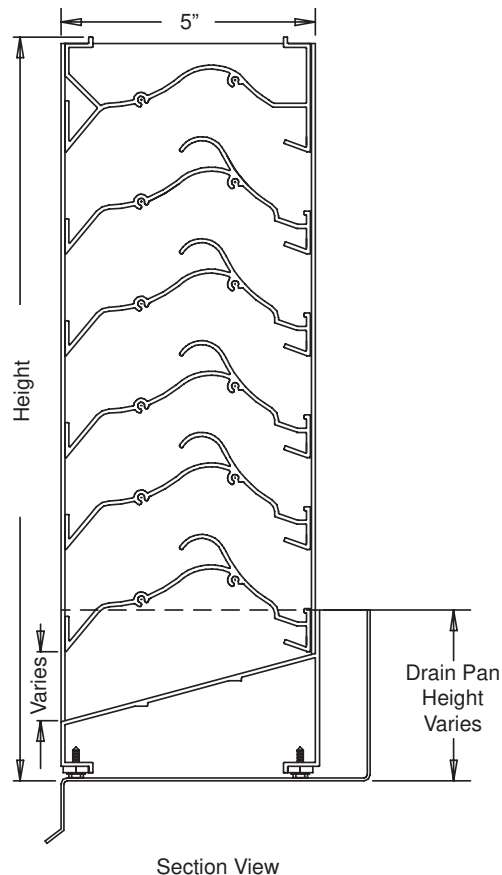
NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.

2. Shipping weight approximately 5.5 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A590	12"W x 12"H	40 sq.ft



air balance

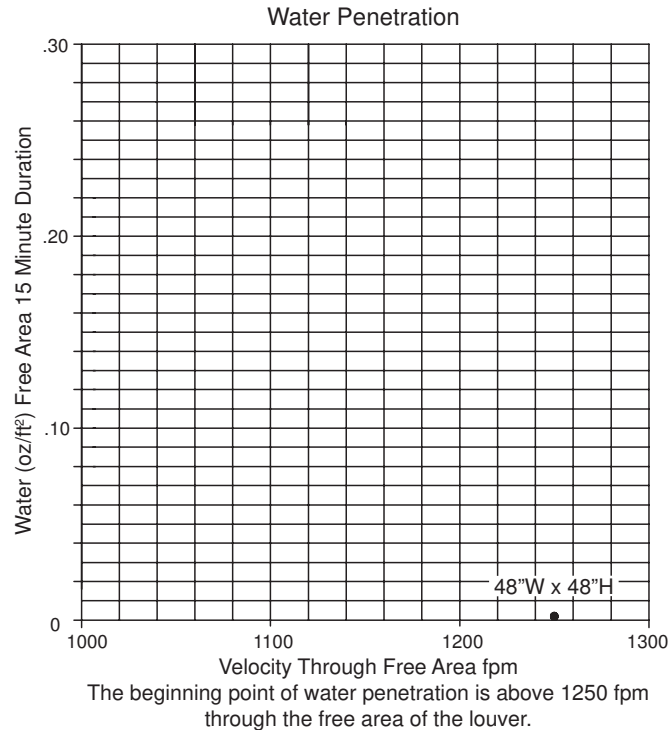
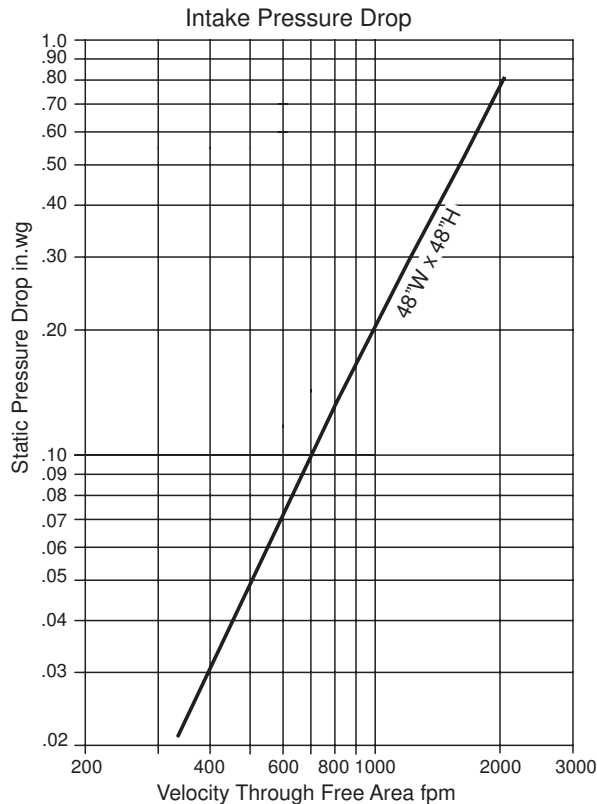
Dampers  Louvers
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MODEL A590

5" Deep • Chevron Drainable Blade • Sightproof • Wind Drive Rain Extruded Aluminum Louver

Pressure Drop: 0.21 in.wg at 1000 fpm and 8850 scfm
 Free Area: 7.08 sq.ft. = 44.3% for 48"W x 48"H test size

Ratings do not include the effects of birdscreen.



*AMCA Standard 500-L Limits Testing of Water Penetration to either a maximum velocity of 1250 fpm or 2.5 ounces of water per sq.ft of louver free area.

Free Area sq.ft

		Width									
		12"	24"	36"	48"	60"	72"	84"	96"	108"	120"
Height	12"	0.21	0.49	0.76	1.04	1.31	1.58	1.86	2.13	2.40	2.68
	24"	0.63	1.43	2.24	3.04	3.85	4.65	5.46	6.26	7.07	7.87
	36"	1.04	2.38	3.72	5.05	6.39	7.73	9.06	10.54	11.73	13.07
	48"	1.46	3.33	5.19	7.08	8.93	10.80	12.67	14.53	16.40	18.27
	60"	1.88	4.27	6.67	9.07	11.47	13.87	16.27	18.67	21.07	23.46
	72"	2.29	5.22	8.15	11.08	14.01	16.94	19.87	22.80	25.73	28.66
	84"	2.71	6.17	9.63	13.09	16.55	20.01	23.47	26.93	30.40	33.86
	96"	3.12	7.11	11.11	15.10	19.09	23.08	27.08	31.07	35.06	39.05
	108"	3.54	8.06	12.58	17.11	21.63	26.16	30.68	35.20	39.73	44.25
	120"	3.95	9.01	14.06	19.12	24.17	29.23	34.28	39.34	44.39	49.45



Air Balance certifies that the Model A590 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance, Water Penetration, and Wind Driven Rain Ratings only.

air balance

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 UL Life Safety Products
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 Member of AMCA

MODEL A590

5" Deep • Chevron Drainable Blade • Sightproof • Wind Drive Rain Extruded Aluminum Louver

Wind Driven Rainwater Penetration Test Conducted to AMCA Standard 500-L

Test Size 1m x 1m (39.37" x 39.37") Core Area, 41.87"W x 42.77"H Nominal. Louver Free Area 5.54 sq.ft.

Core Ventilation m/s	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	Rainfall / mph
fpm	0	0	0	0	385	474	583	682	771	866	981	3 in/hr Rainfall and 29 mph Velocity
Free Area Ventilation cfm	-	-	-	-	4143	5108	6276	7347	8303	9321	10,560	
Free Area Velocity fpm	-	-	-	-	748	922	1133	1326	1499	1682	1906	
Effective Rating Class	A	A	A	A	A	A	A	B	B	C	C	
Effectiveness Ratio %	-	-	-	-	99.8	99.6	99.0	97.1	95.1	90.6	89.3	
fpm	0	122	190	285	390	481	569	673	773	884	945	8 in/hr Rainfall and 50 mph Velocity
Free Area Ventilation cfm	-	1313	2049	3071	4202	5179	6129	7243	8324	9521	10,174	
Free Area Velocity fpm	-	237	370	554	758	935	1106	1307	1503	1719	1836	
Effective Rating Class	B	B	B	B	B	B	B	B	C	C	C	
Effectiveness Ratio %	98.3	98.2	98.1	97.9	97.7	97.9	97.6	95.7	93.9	89.8	85.8	

Wind Driven Rain Penetration Classifications	
Class	Effectiveness %
A	1 - 0.99%
B	0.989 - 0.95%
C	0.949 - 0.80%
D	Below 0.80%

Discharge Loss Coefficient Classifications	
Class	Discharge Loss Coefficient
1	0.4 and Above
2	0.3 - 0.399
3	0.2 - 0.299
4	0.199 and Below

Discharge Coefficient
Intake Cd = 0.29 (Class 3)

1. Core Area is the front opening of a louver assembly with the blades removed.
2. Core Area Velocity is the airflow rate through the louver divided by the core area (39.37"W x 39.37"H).
3. Free Area is the minimum area through which air can pass. It is determined by multiplying the sum of the minimum distances between intermediate blades, top blade, and head, bottom blade and sill, by the minimum distance between jambs.
4. Discharge Loss Coefficient is calculated by dividing a louver actual airflow rate vs. a theoretical airflow for the opening. Providing an indication of the louver air flow characteristics.

MODEL A590

5" Deep • Chevron Drainable Blade • Sightproof • Wind Drive Rain Extruded Aluminum Louver

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MODEL A624

6" Deep • Drainable Vertical Blade • Rain Resistant Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

EXTERIOR FRAME: .080" thick; 6063-T6/T52 extruded aluminum alloy

BLADES: .080" thick; 6063-T6/T52 extruded aluminum alloy

BLADE SPACING: 1.6"

ASSEMBLY: Mechanically fastened

EXTENDED SILL: .060" thick formed aluminum

SCREEN: ½" x .051" attened aluminum birdscreen

FINISH: Mill

OPTIONS

Finish - Baked Powder Polyester, Kynar, or Anodize

Variety of Bird and Insect Screen

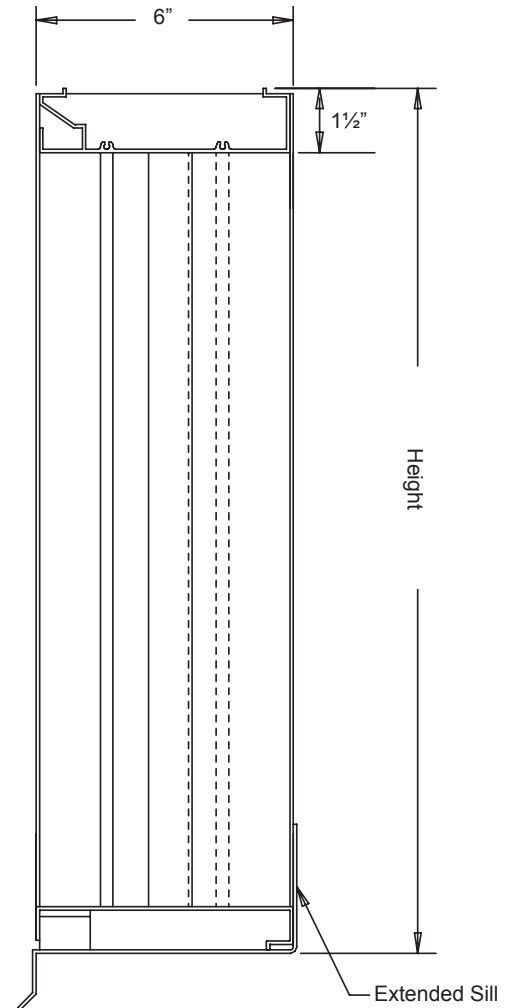
Blank-off Panels

NOTES

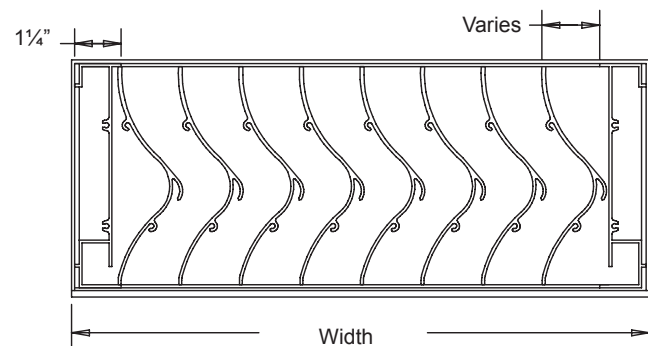
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undercut.
2. Shipping weight approximately 7 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A624	12"W x 12"H	30 sq.ft 120"W 120"H



Section View



Width

air balance

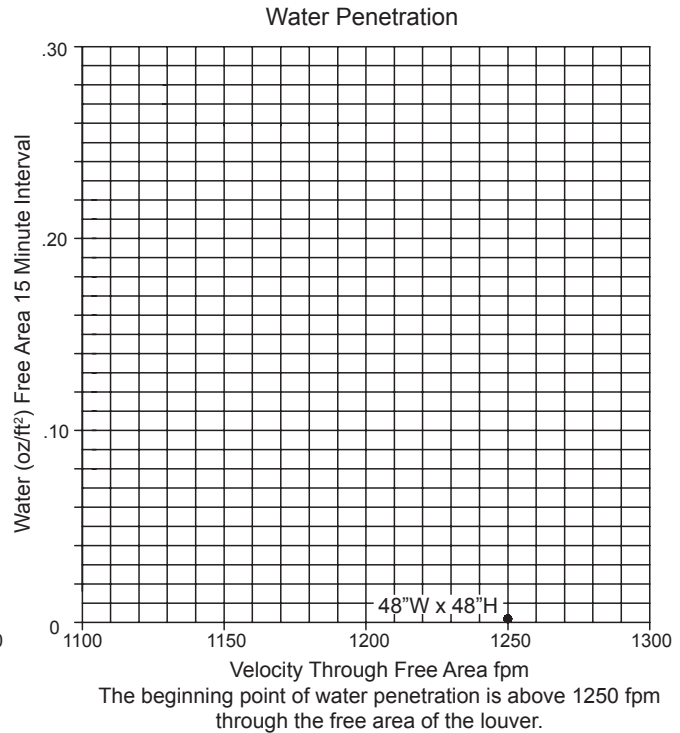
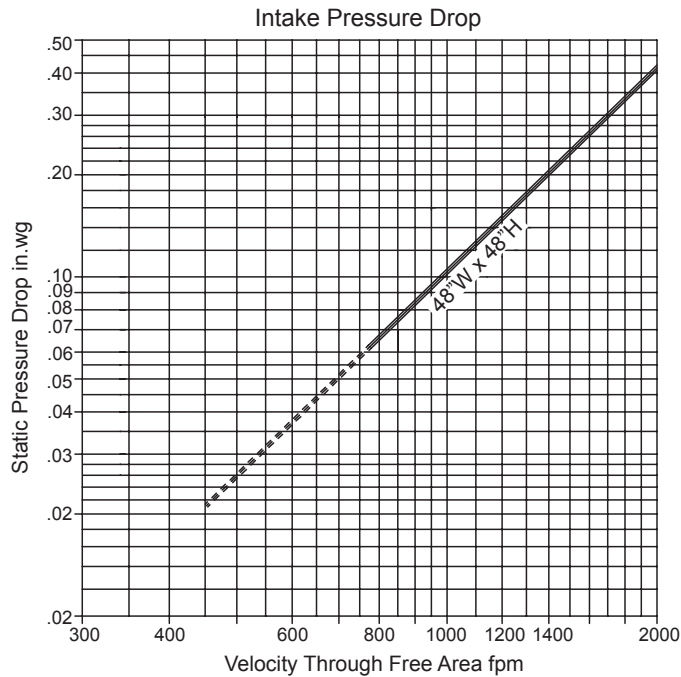
Dampers  Louvers
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MODEL A624

6" Deep • Drainable Vertical Blade • Rain Resistant Extruded Aluminum Louver

Pressure Drop: 0.16 in.wg at 1250 fpm and 10,638 scfm
 Free Area: 8.51 sq.ft. = 53% for 48"W x 48"H test size

Ratings do not include the effects of birdscreen.



*AMCA Standard 500-L Limits Testing of Water Penetration to either a maximum velocity of 1250 fpm or 2.5 ounces of water per sq.ft of louver free area.

Free Area sq.ft.

		Width									
		12"	24"	36"	48"	60"	72"	84"	96"	108"	120"
Height	12"	0.25	0.76	1.20	1.71	2.15	2.60	3.10	3.55	3.99	4.50
	24"	0.58	1.73	2.73	3.88	4.89	5.90	7.05	8.05	9.06	10.21
	36"	0.90	2.69	4.26	6.06	7.63	9.20	10.99	12.56	14.13	15.93
	48"	1.22	3.66	5.79	8.51	10.36	12.50	14.94	17.07	19.20	21.64
	60"	1.54	4.62	7.32	10.40	13.10	15.80	18.88	21.58	24.28	27.36
	72"	1.86	5.59	8.85	12.58	15.84	19.10	22.83	26.09	29.35	33.07
	84"	2.19	6.56	10.38	14.75	18.58	22.40	26.77	30.59	34.42	38.79
	96"	2.51	7.52	11.91	16.92	21.31	25.70	30.71	35.10	39.49	44.50
	108"	2.83	8.49	13.44	19.10	24.05	29.00	34.66	39.61	44.56	50.22
	120"	3.15	9.45	14.97	21.27	26.79	32.30	38.60	44.12	49.63	55.94



Air Balance certifies that the Model A624 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance, Water Penetration, and Wind Driven Rain Ratings only.

MODEL A624

6" Deep • Drainable Vertical Blade • Rain Resistant Extruded Aluminum Louver

Wind Driven Rainwater Penetration Test Conducted to AMCA Standard 500-L
 Test Size 1m x 1m (39.37"W x 39.37"H) Core Area, 41.88" x 41.75" Nominal. Louver Free Area 6.0 sq.ft.

Core Ventilation (m/s)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	Rainfall/mph
ftpm	0	98	197	295	394	492	591	689	787	886	985	3"/hr Rainfall and 29 mph Velocity
Free Area Ventilation cfm											10,710	
Free Area Velocity fpm											1785	
Effective Rating Class	A	A	A	A	A	A	A	A	A	A	A	
Effectiveness Ratio %											100	
ftpm											952	8"/hr Rainfall and 50 mph Velocity
Free Area Ventilation cfm											10,248	
Free Area Velocity fpm											1709	
Effective Rating Class	A	A	A	A	A	A	A	A	A	A	A	
Effectiveness Ratio %											100	

Discharge Coef. cicient
 Intake Cd = 0.46 (Class I)

Wind Driven Rain Penetration Classifications

Class	Effectiveness %
A	1% - 0.99%
B	0.989% - 0.95%
C	0.949% - 0.80%
D	Below 0.80%

Discharge Loss Coef. cicient Classifications

Class	Effectiveness %
1	0.4 and Above
2	3.3 - 0.399
3	0.2 - 0.299
4	0.199 and Below

Class I Loss Coef. cicient has the least
 resistance to air ow.

1. Core Area is the front opening of a louver assembly with the blades removed.
2. Core Area Velocity is the air ow rate through the louver divided by the Core Area (39.37"W x 39.37"H)
3. Free Area is the minimum area through which air can pass. It is determined by multiplying the sum of the minimum distances between intermediate blades, top blade and head, bottom blade and sill, by the minimum distance between jambs.
4. Discharge Loss Coef. cicient is calculated by dividing a louver actual air ow rate vs. a theoretical air ow for the opening. Providing an indication of the louver air ow characteristics.

This is to certify that the "Building Services Research and Information Association" (BSRIA) have type tested the product described below to the requirements contained in the 5th edition of the HEVAC Technical Specifications "Laboratory testing and ratings of weather louvers when subjected to simulated wind driven rain".

Test Results
 Based on Calibration Plate and Louver Core Size 10.76 sq.ft. (1m²)

	cfm (m ³ /s)						
Ventilation Rate Air Flow (cfm)	0	1059 (0.5)	2119 (1.0)	3178 (1.5)	4238 (2.0)	5297 (2.5)	7416 (3.5)
Rating Achieved	A	A	A	A	A	A	A

Coef. cicient of Discharge or Entry: 0.419, Class I

Wind Speed: 30.2 mph (13.5 m/s) Rainfall: 2.95 in/hr (75 mm/hr)

Example: $\frac{7416 \text{ cfm (3.5 m}^3\text{/s)}}{10.76 \text{ sq.ft. (1 m}^2\text{)}} = 689 \text{ fpm Face Velocity} / (\text{Sample Louver Free Area } 48\%) = 1435 \text{ fpm Free Area Velocity}$

MODEL A624

6" Deep • Drainable Vertical Blade • Rain Resistant Extruded Aluminum Louver

Classifications of Weather Louvers

Extract taken from the HEVAC Technical Specification for reference purposes only.

Classification for Rain Penetration

Class	Effectiveness %	Maximum Allowed Penetration of Simulated Rain oz/ft ² /hr (l/m ² /hr)
A	1 - 0.99%	2.4 (0.75)
B	0.989 - 0.95%	11.8 (3.75)
C	0.949 - 0.80%	47.1 (15.0)
D	Below 0.8	Greater Than 47.1 (15.0)

Classification for Coefficient of Discharge or Entry

Class	Effectiveness %
1	0.4 and Above
2	0.3 - 0.399
3	0.2 - 0.299
4	0.199 and below

This test, HEVAC, result with the louver obtaining the highest performance classifications for this test method.

HEVAC Testing at Other Windspeeds and Rainfall Rates:

30 mph at 4.72" Rainfall at 1517 fpm (12,910 cfm) Ventilation Rate thru Free Area is 100% Effective
 55 mph at 2.95" Rainfall at 1517 fpm (12,910 cfm) Ventilation Rate thru Free Area is 100% Effective
 55 mph at 4.72" Rainfall at 1600 fpm (13,616 cfm) Ventilation Rate thru Free Area is 99.99% Effective

MODEL A675

6" Deep • Drainable Blade • Combination • Rain Resistant Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

EXTERIOR FRAME: .081" thick; 4" deep; 6063-T6/T52 extruded aluminum alloy

INTERIOR FRAME: .063" thick; 2" deep; 6063-T6/T52 extruded aluminum alloy

BLADES: Sight proof double blade with exterior blade at a 37° angle

DRAIN SILL PAN: .060" thick; formed aluminum

ASSEMBLY: Mechanically fastened

SCREEN: ½" x .051" attened aluminum birdscreen

FINISH: Mill

OPTIONS

Finish - Baked Enamel, Kynar, or Anodize

Variety of Bird and Insect Screen

1⅜" Usable Flange Frame (Front Face Only)

Welded Construction

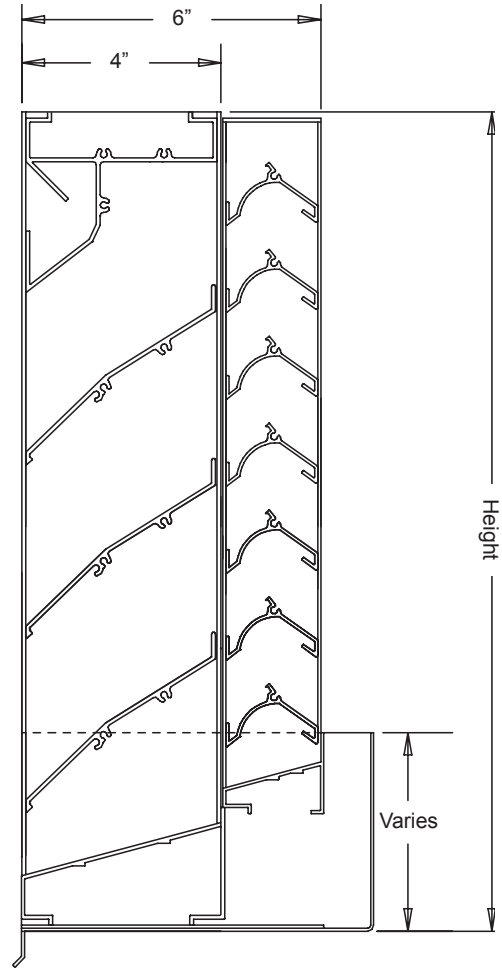
Blank-off Panels

NOTES

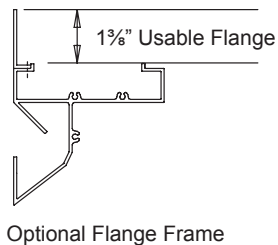
1. "A" width and "B" height are opening dimensions. Louvers are provided ½" undercut.
2. Shipping weight approximately 9 lbs./sq.ft.

LOUVER SIZES

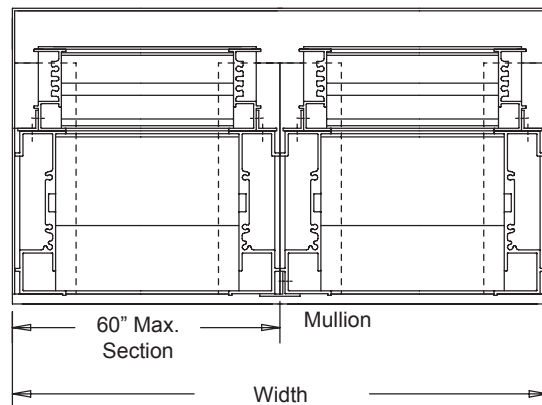
Panels	Min Panel	Max Single Panel
A675	12"W x 12"H	60"W x 96"H



Section View



Optional Flange Frame



air balance

Dampers  Louvers
UL Life Safety Products
Division of Mestek
Member of AMCA

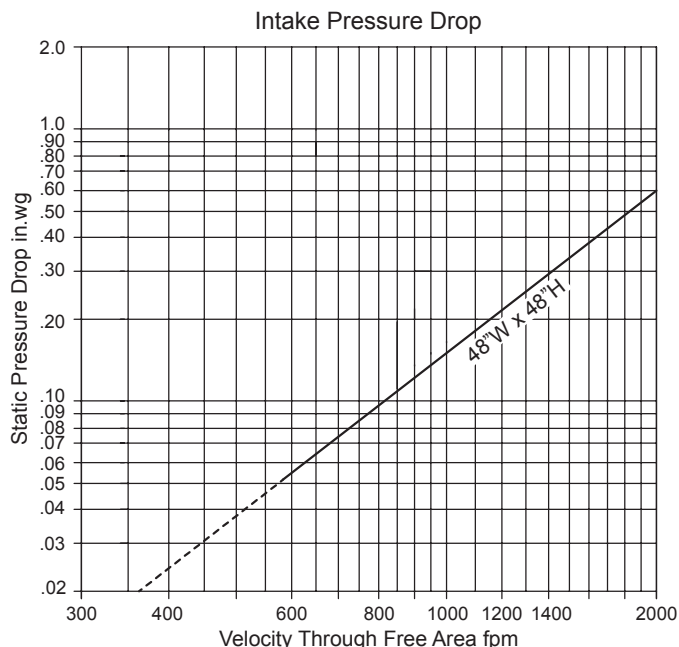
MODEL A675

6" Deep • Drainable Blade • Combination • Rain Resistant Extruded Aluminum Louver

Pressure Drop: 0.097 in.wg at 800 fpm and scfm

Free Area: 7.07 sq.ft. = 44% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.



Free Area sq.ft

	Width								
Height	12"	18"	24"	30"	36"	42"	48"	54"	60"
12"	0.17	0.29	0.40	0.51	0.62	0.73	0.84	0.95	1.06
24"	0.58	0.96	1.33	1.70	2.08	2.45	2.82	3.20	3.57
36"	0.99	1.63	2.26	2.90	3.54	4.17	4.81	5.44	6.08
48"	1.40	2.30	3.20	4.10	4.99	5.89	6.79	7.69	8.58
60"	1.81	2.97	4.13	5.29	6.45	7.61	8.77	9.93	11.09
72"	2.22	3.64	5.07	6.49	7.91	9.33	10.75	12.17	13.59
84"	2.63	4.32	6.00	7.68	9.37	11.05	12.73	14.42	16.10
96"	2.98	4.89	6.80	8.71	10.62	12.52	14.43	16.34	18.25

Discharge Coef. cent
Intake Cd = 0.33 (Class 2)

Wind Driven Rainwater Penetration Test Conducted to AMCA Standard 500-L-99Test Size 39.37"W x 39.37"H (1m x 1m) Core Area, Nominal Louver Free Area is 5.24ft²

Core Ventilation (m/s)	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	Rainfall/mph
fpm	0	136	187	303	379	475	577	686	3 in/hr Rainfall and 29 mph Velocity
Free Area Ventilation (cfm)	0	1469	2013	3259	4080	5110	6215	7382	
Free Area Velocity (fpm)	0	260	357	578	723	906	1102	1309	
Effective Rating Class	A	A	B	B	B	B	C	C	

Wind Driven Rain Penetration Classifications

Class	Effectiveness %
A	1 - 0.99%
B	0.989 - 0.95%
C	0.949 - 0.80%
D	Below 0.80%

Discharge Loss Coef. cent Classifications

Class	Discharge Loss Coef. cent
1	0.4 and above
2	0.3 - 0.399
3	0.2 - 0.299
4	0.199 and below

Class I Loss Coef. cent has the least
Resistance to Air Flow

1. Core Area is the front opening of a louver assembly with the blades removed.
2. Core Area Velocity is the air flow rate through the louver divided by the core area (39.37" x 39.37")
3. Free Area is the minimum area through which air can pass. It is determined by multiplying the sum of the minimum distances between intermediate blades, top blade and head, bottom blade and sill, by the minimum distance between jambs.
4. Discharge Loss Coef. cent is calculated by dividing a louver actual air flow rate vs. a theoretical air flow for the opening, providing an indication of the louver air flow characteristics.



ABI certifies that the Model A675 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Wind Driven Rain Penetration Ratings.

MODEL A680

6" Deep • Fixed Chevron Blade • Hurricane Louver

STANDARD MATERIALS AND CONSTRUCTION

HEAD: .125" thick; extruded 6063-T6 aluminum

SILL: .125" thick; extruded 6063-T6 aluminum

JAMBS: .080" thick; extruded 6063-T6 aluminum

BLADES: .081" thick; extruded 6063-T6 aluminum

SILL PAN: .060" thick; formed aluminum

BLADE SPACING: 1.625"

ASSEMBLY: Mechanical fastened

FINISH: Mill

SCREEN: 1/2" removable expanded aluminum bird screen located on interior

MULLIONS: Exposed, vertical with 1.75" x .08" 6063-T5 extruded aluminum cover (multiple panels only)

DESIGN DATA: NOA Pending - TAS 100 with damper in sleeve, TAS 201, 202, 203
ASTM E1996 "E", ASTM E330, ASTM E1886

This system has been tested for water infiltration resistance and is a water resistant system when an AFD20 or AC525/526 damper is installed with the louver panel. This louver system has been designed in accordance with and meet the requirements of the FBC including High Velocity Hurricane Zones (HVHZ).

OPTIONS

Finishes - Baked Enamel, Kynar, Anodize

Variety of bird and insect screens

Extended Sill (Formed .063" aluminum)

Flange Frame 1 1/2"W x 1/8" thick

Architectural Vertical Mullion

Sleeve

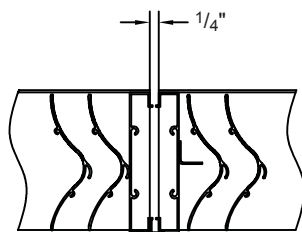
Sleeve with Damper

NOTES

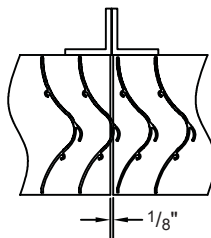
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1" undersize.
2. Louver panels may be butted together to infinite width with a maximum height of 96". Maximum single panel is 48"W x 96"H.
3. Approved opening types: wood, steel, or concrete/masonry (masonry acceptable at jambs only, head and sill must be concrete). Anchoring details may vary.
4. Units are supplied with 2" x 2" mounting angles and mounting hardware for concrete installation as a standard. Please specify if louvers are to be mounted in substrate other than concrete, OR if the installation will require a 2" x 4" mounting angle. Larger, 2" x 4" mounting angles may be required to either maintain the minimum edge distance, or to ensure that the screws don't penetrate the sill pan of the louver.
5. See installation sketches for required mounting structure.

LOUVER SIZES

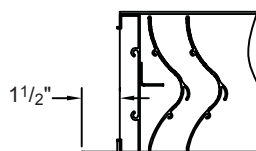
Panels	Min Panel	Max Single Panel
A680	12"W x 12"H	48"W x 96"H



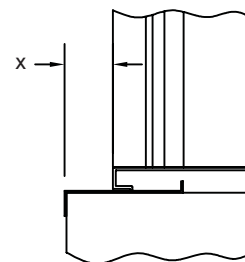
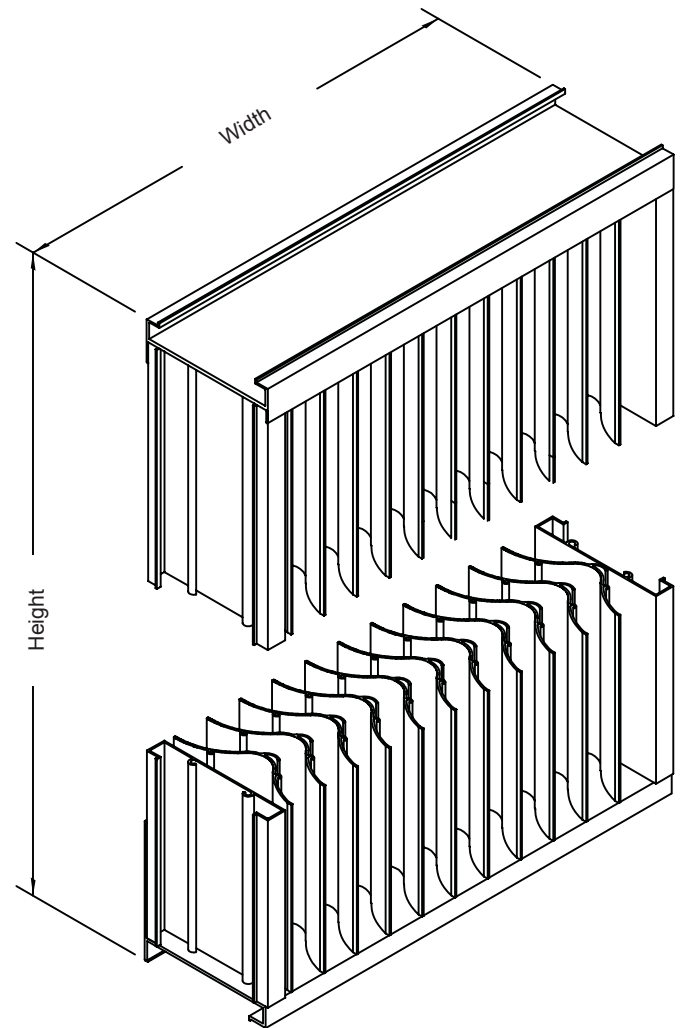
Standard Exposed
Vertical Mullion



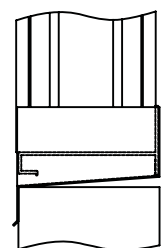
Optional Architectural
Vertical Mullion



Optional Flange
Frame



Optional Extended
Sill



Standard Sill Pan



Air Balance Inc. certifies that the model A680 louver shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Water Penetration and Air Performance Ratings only.

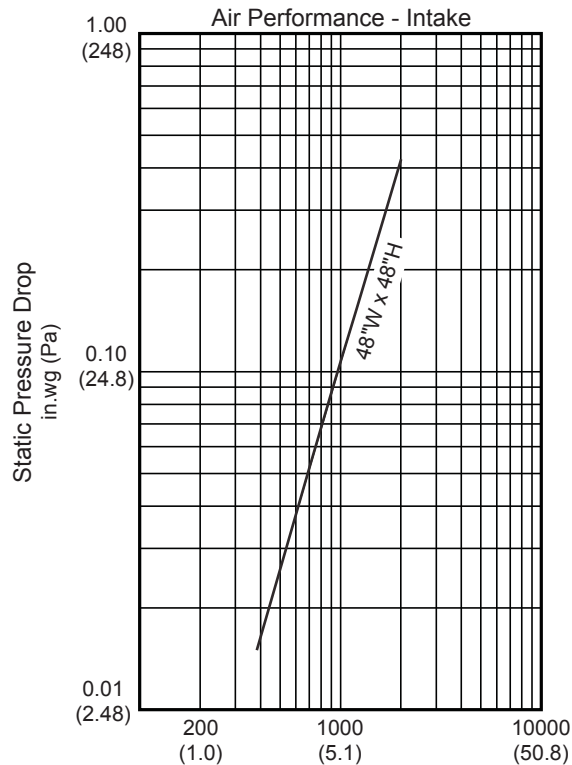


MODEL A680

6" Deep • Fixed Chevron Blade • Hurricane Louver

Air Performance: 0.164 in.wg (40.6 Pa) at 1250 fpm (6.35 m/s) and 9813 scfm (4.63 scm/s)**Free Area:** 7.85 sq.ft. (0.729 sq.m) = 49.1% for 48"W x 48"H (1.22m x 1.22m) test size

1. Test size is 48"W x 48"H (1.2m x 1.2m)
2. Ratings do not include the effect of a screen.
3. Data is at standard air density (0.75 lbs/cu ft.).



Velocity Through Free Area fpm (m/s)

Standard air - 0.075 lbs. per cu.ft.

Ratings do not include the effect of a wire birdscreen.

Test based on a 48"W x 48"H test size per AMCA Standard 511.

		Free Area in sq.ft. (sq m)							
Height	Width								
		12 (305)	24 (610)	36 (914)	48 (1219)	60 (1524)	72 (1829)	84 (2134)	96 (2438)
12 (305)		0.28 (0.026)	0.67 (0.062)	1.09 (0.101)	1.52 (0.141)	1.90 (0.177)	2.33 (0.216)	2.71 (0.252)	3.14 (0.292)
24 (610)		0.67 (0.062)	1.59 (0.148)	2.61 (0.242)	3.63 (0.337)	4.55 (0.423)	5.56 (0.517)	6.48 (0.602)	7.50 (0.697)
36 (914)		1.07 (0.099)	2.52 (0.234)	4.13 (0.384)	5.74 (0.533)	7.19 (0.668)	8.80 (0.818)	10.25 (0.952)	11.86 (1.102)
48 (1219)		1.46 (0.136)	3.44 (0.320)	5.65 (0.525)	7.85 (0.729)	9.83 (0.913)	12.04 (1.119)	14.02 (1.303)	16.22 (1.507)
60 (1524)		1.85 (0.172)	4.37 (0.406)	7.16 (0.665)	9.96 (0.925)	12.48 (1.159)	15.27 (1.419)	17.79 (1.653)	20.59 (1.913)
72 (1829)		2.24 (0.208)	5.30 (0.492)	8.68 (0.806)	12.07 (1.121)	15.12 (1.405)	18.51 (1.720)	21.56 (2.003)	24.95 (2.318)
84 (2134)		2.63 (0.244)	6.22 (0.578)	10.20 (0.946)	14.18 (1.317)	17.77 (1.651)	21.75 (2.021)	25.33 (2.353)	29.31 (2.723)
96 (2438)		3.03 (0.281)	7.15 (0.664)	11.72 (1.089)	16.29 (1.513)	20.41 (1.896)	24.98 (2.321)	29.11 (2.704)	33.68 (3.129)

Blade Spacing	Rainfall Rate	Wind Velocity	Core Velocity	Air ow	Free Area Velocity	Water Penetration Effectiveness	Discharge Loss Coef cient
2" (50.8 mm)	3 in/hr (76 mm/h)	29 mph (46.7 kph)	980 fpm (5 m/s)	10546 cfm (299 m³/min)	2170 fpm (11 m/s)	100% - Class A	≥ 0.4 - Class 1
2" (50.8 mm)	8 in/hr (203 mm/h)	50 mph (80.47 kph)	784 fpm (4 m/s)	8440 cfm (239 m³/min)	1736 fpm (8.8 m/s)	99.2% - Class A	≥ 0.4 - Class 1
2" (50.8 mm)	8 in/hr (203 mm/h)	50 mph (80.47 kph)	877 fpm (4.5 m/s)	9445 cfm (267 m³/min)	1943 fpm (9.9 m/s)	99.1% - Class A	≥ 0.4 - Class 1
2" (50.8 mm)	8 in/hr (203 mm/h)	50 mph (80.47 kph)	982 fpm (5 m/s)	10578 cfm (300 m³/min)	2176 fpm (11 m/s)	99.1% - Class A	≥ 0.4 - Class 1

Wind Driven Rain Performance Test based on 39.37"W x 39.37"H (1m x 1m) Core Area Louver with 5.88 ft² (0.546m²) Free Area.

Air Balance Inc. certifies that the model A680 louver shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Water Penetration and Air Performance Ratings only.



In the interest of product development, Air Balance reserves the right to make changes without notice.

P.O. Box 606 • 7435 Industrial Rd. • Florence, KY 41042 • Phone: (859) 538-3400 • Fax: (859) 647-7810

MODEL A750

7" Deep • Chevron Drainable Blade • Sightproof • Wind Drive Rain Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

EXTERIOR FRAME: .080" thick; 6063-T6/T52 extruded aluminum alloy

BLADES: .080" thick; 6063-T6/T52 extruded aluminum alloy

ASSEMBLY: Mechanically fastened

SCREEN: 1/2" x .051" attened aluminum birdscreen

FINISH: Mill

OPTIONS

Finish - Baked Enamel, Kynar, or Anodize

Variety of Bird and Insect Screen

1 3/8" Usable Flange Frame (3 Sides Only, Not on Sill)

Welded Construction

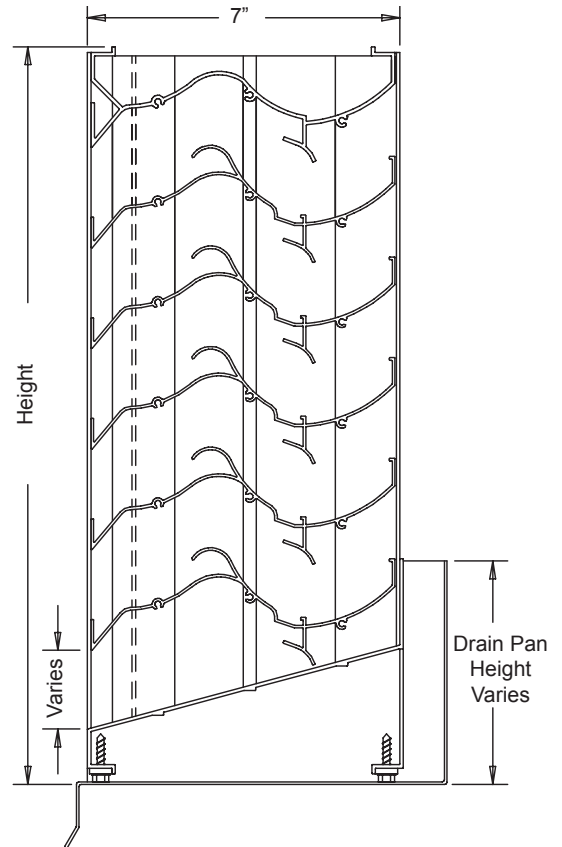
Blank-off Panels

NOTES

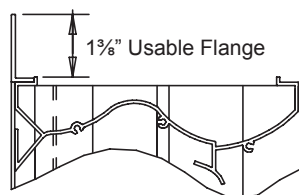
1. "A" width and "B" height are opening dimensions. Louvers are provided 1/2" undercut.
2. Shipping weight approximately 9 lbs./sq.ft.

LOUVER SIZES

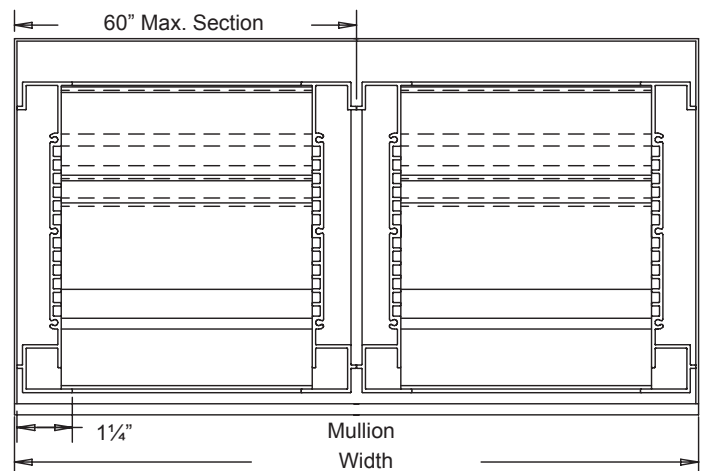
Panels	Min Panel	Max Single Panel
A750	12"W x 12"H	30 sq.ft



Section View



Optional Flange Frame



air balance

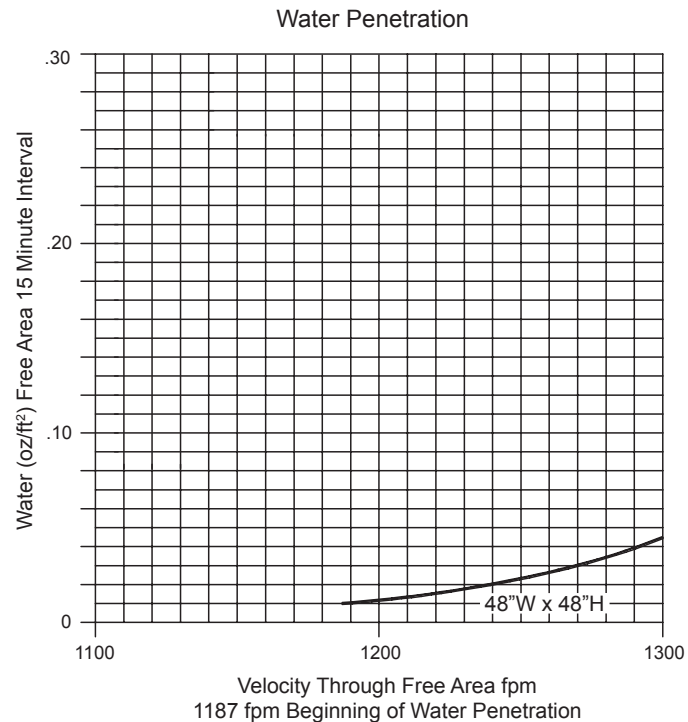
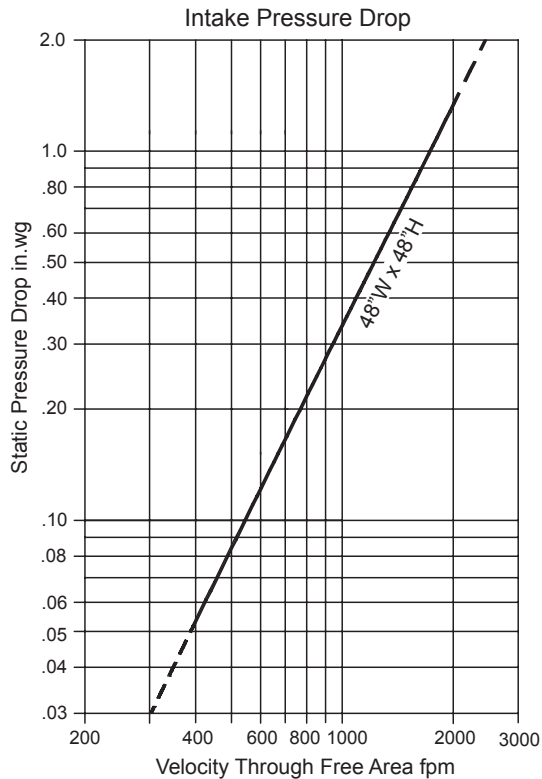
Dampers  Louvers
UL Life Safety Products
Division of Mestek
Member of AMCA

MODEL A750

7" Deep • Chevron Drainable Blade • Sightproof • Wind Drive Rain Extruded Aluminum Louver

Pressure Drop: 0.33 in.wg at 1000 fpm and 8570 scfm
 Free Area: 7.22 sq.ft. = 45.1% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.



Free Area sq.ft

		Width									
		12"	24"	36"	48"	60"	72"	84"	96"	108"	120"
Height	12"	0.24	0.55	0.86	1.17	1.48	1.79	2.10	2.41	2.72	3.03
	24"	0.63	1.44	2.25	3.06	3.87	4.68	5.49	6.30	7.11	7.92
	36"	1.02	2.33	3.65	4.96	6.27	7.58	8.89	10.20	11.51	12.82
	48"	1.49	3.40	5.32	7.22	9.14	11.05	12.96	14.87	16.78	18.69
	60"	1.89	4.30	6.71	9.12	11.53	13.94	16.35	18.77	21.18	23.59
	72"	2.28	5.19	8.10	11.01	13.92	16.84	19.75	22.66	25.57	28.49
	84"	2.75	6.26	9.77	13.28	16.80	20.31	23.82	27.33	30.85	34.36
	96"	3.14	7.15	11.16	15.18	19.19	23.20	27.22	31.23	35.24	39.26
	108"	3.53	8.04	12.56	17.07	21.58	26.10	30.61	35.12	39.64	44.15
	120"	4.00	9.11	14.23	19.34	24.46	29.57	34.68	39.80	44.91	50.03



Air Balance certifies that the Model A750 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance, Water Penetration, and Wind Driven Rain Ratings only.

MODEL A750

7" Deep • Chevron Drainable Blade • Sightproof • Wind Drive Rain Extruded Aluminum Louver

Wind Driven Rainwater Penetration Test Conducted to AMCA Standard 500-L

Test Size 1m x 1m (39.37" x 39.37") Core Area, 41.87"W x 42.86"H Nominal. Louver Free Area 5.29 sq.ft.

Core Ventilation m/s	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	Rainfall / mph
fpm	0	0	0	0	0	482	569	657	751	864	977	3 in/hr Rainfall and 29 mph Velocity
Free Area Ventilation cfm	-	-	-	-	-	5195	6126	7076	8086	9306	10,519	
Free Area Velocity fpm	-	-	-	-	-	982	1158	1338	1529	1759	1988	
Effective Rating Class	A	A	A	A	A	A	A	A	C	C	C	
Effectiveness Ratio %	-	-	-	-	-	100	99.8	99.3	94.8	90.0	83.1	
fpm	0	0	0	0	0	482	578	659	763	847	974	8 in/hr Rainfall and 50 mph Velocity
Free Area Ventilation cfm	-	-	-	-	-	5189	6227	7096	8210	9115	10,483	
Free Area Velocity fpm	-	-	-	-	-	981	1177	1341	1552	1723	1982	
Effective Rating Class	A	A	A	A	A	A	A	B	C	C	C	
Effectiveness Ratio %	-	-	-	-	-	100	99.0	96.5	92.9	88.6	80.8	

Wind Driven Rain Penetration Classifications	
Class	Effectiveness %
A	1 - 0.99%
B	0.989 - 0.95%
C	0.949 - 0.80%
D	Below 0.80%

Discharge Loss Coefficient Classifications	
Class	Discharge Loss Coefficient
1	0.4 and Above
2	0.3 - 0.399
3	0.2 - 0.299
4	0.199 and Below

Discharge Coefficient
Intake Cd = 0.22 (Class 3)

1. Core Area is the front opening of a louver assembly with the blades removed.
2. Core Area Velocity is the air flow rate through the louver divided by the core area (39.37"W x 39.37"H).
3. Free Area is the minimum area through which air can pass. It is determined by multiplying the sum of the minimum distances between intermediate blades, top blade, and head, bottom blade and sill, by the minimum distance between jambs.
4. Discharge Loss Coefficient is calculated by dividing a louver actual air flow rate vs. a theoretical air flow for the opening. Providing an indication of the louver air flow characteristics.

August 2009

MODEL A750

7" Deep • Chevron Drainable Blade • Sightproof • Wind Drive Rain Extruded Aluminum Louver

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8" Deep • Fixed Chevron Blade • Extruded Aluminum Stationary Louver

STANDARD MATERIALS AND CONSTRUCTION**HEAD:** .125" thick; formed 6063-T5 aluminum**SILL:** .125" thick; formed 6063-T5 aluminum**JAMBS:** .080" thick; extruded 6063-T5 aluminum**BLADES:** .24" thick at edges, reducing to .063" thickness at midpoint of profile**BLADE SPACING:** 1.25"**ASSEMBLY:** Welded**FINISH:** Mill**SCREEN:** None**MULLIONS:** Exposed, vertical with 1.75" x .08" 6063-T5 extruded aluminum cover (multiple panels only); Exposed, horizontal**OPTIONS**

Finishes - Baked Enamel, Kynar, Anodize

Variety of bird and insect screens

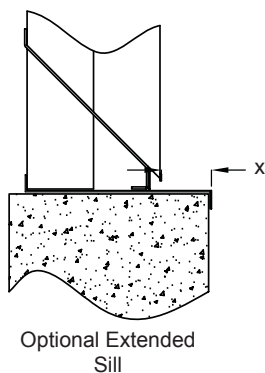
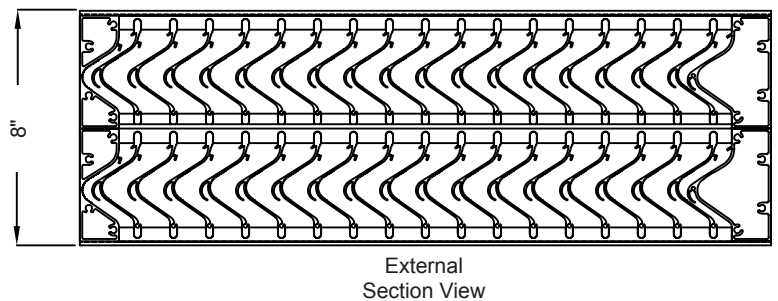
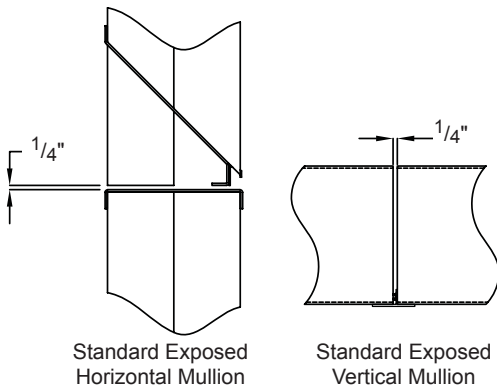
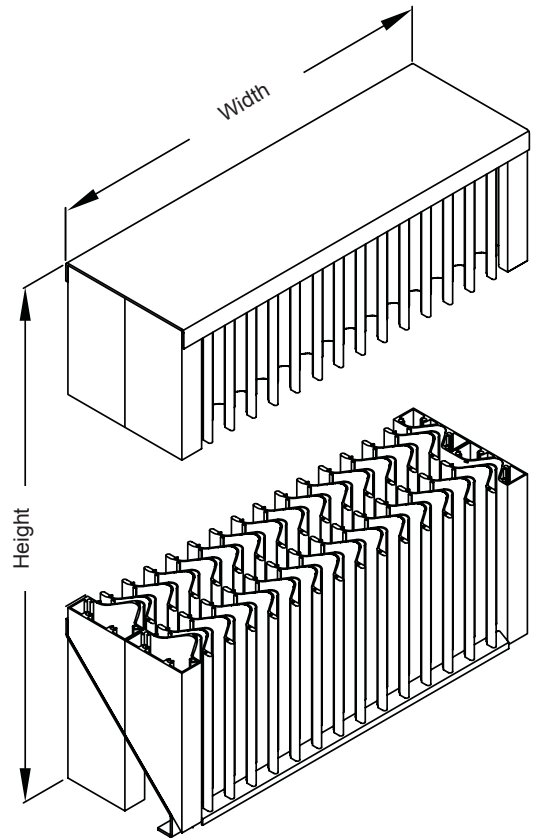
Extended Sill (Formed .063" aluminum)

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undersize.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A800	12"W x 18"H	48"W x 96"H

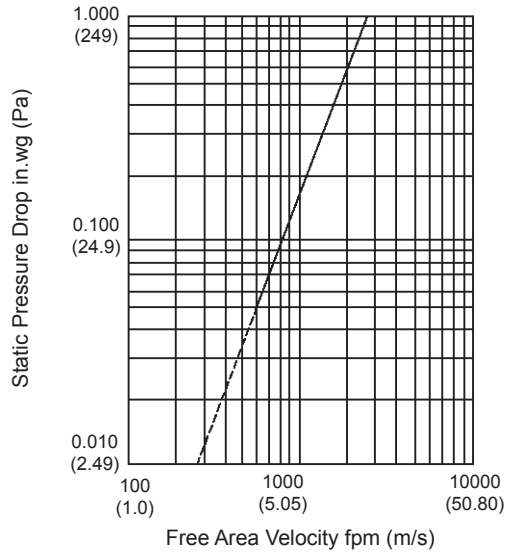


8" Deep • Fixed Chevron Blade • Extruded Aluminum Stationary Louver

Air Performance: 0.65 in.wg (161.91 Pa) at 1250 fpm (6.4m/s) and 9667 scfm (4.6 scm/s)

Free Area: 4.41 sq ft (0.410sq m) = 27.56%

1. Test size is 48"W x 48"H (1.2m x 1.2m).
2. Ratings do not include the effect of a screen.
3. Data is at standard air density.

Air Performance - Intake**Sand Removal Efficiency**

Pressure Drop	.10 in.wg (24.91 Pa)	.20 in.wg (49.82 Pa)	.30 in.wg (74.73 Pa)
Free Area Velocity	940 fpm (4.78 m/s)	1300 fpm (6.6m/s)	1600 fpm (8.13 m/s)
Sand Particle Size	Removal Efficiency	Removal Efficiency	Removal Efficiency
1-1100 MICRON	96.1%	86.3%	74.3%
1100-1500 MOCRON	99.9%	99.8%	99.2%

Free Area in sq.ft.(sq.m)

		Width								
		12 (305)	24 (610)	36 (914)	48 (1219)	60 (1524)	72 (1829)	84 (2134)	96 (2438)	
Height	18 (457)	0.18 (0.016)	0.41 (0.038)	0.65 (0.060)	0.88 (0.081)	1.12 (0.104)	1.35 (0.125)	1.58 (0.146)	1.82 (0.169)	1 Section
	24 (610)	0.32 (0.030)	0.73 (0.068)	1.17 (0.109)	1.58 (0.147)	2.02 (0.188)	2.43 (0.226)	2.85 (0.265)	3.28 (0.305)	
	36 (914)	0.60 (0.056)	1.39 (0.129)	2.21 (0.206)	3.00 (0.278)	3.82 (0.355)	4.61 (0.428)	5.39 (0.501)	6.22 (0.578)	
	48 (1219)	0.89 (0.082)	2.04 (0.190)	3.26 (0.303)	4.41 (0.410)	5.63 (0.523)	6.78 (0.630)	7.93 (0.737)	9.15 (0.850)	
	60 (1524)	1.17 (0.109)	2.69 (0.250)	4.30 (0.400)	5.83 (0.541)	7.43 (0.690)	8.96 (0.832)	10.48 (0.973)	12.09 (1.123)	
	72 (1829)	1.46 (0.135)	3.35 (0.311)	5.35 (0.497)	7.24 (0.673)	9.24 (0.858)	10.63 (0.988)	12.52 (1.164)	14.42 (1.339)	2 Sections High
	84 (2134)	1.74 (0.162)	4.00 (0.372)	6.39 (0.594)	8.65 (0.804)	11.04 (1.026)	12.71 (1.181)	14.97 (1.391)	17.23 (1.601)	
	96 (2438)	2.03 (0.188)	4.66 (0.433)	7.43 (0.691)	10.07 (0.935)	12.84 (1.193)	14.78 (1.374)	17.42 (1.618)	20.05 (1.863)	
		1 Section				2 Sections Wide				

MODEL A820

8" Deep • Fixed Chevron Blade • Hurricane Louver

STANDARD MATERIALS AND CONSTRUCTION

HEAD: .125" thick; formed 6063-T5 aluminum

SILL: .125" thick; formed 6063-T5 aluminum

JAMBS: .125" thick; extruded 6063-T5 aluminum

BLADES: .24" thick at edges, reducing to .063" thickness at mid point of profile

SILL PAN: Integral to louver

BLADE SPACING: 1.25"

ASSEMBLY: Welded

FINISH: Mill

SCREEN: None

MULLIONS: Exposed, vertical with 1.75" x .08" 6063-T5 extruded aluminum cover (multiple panels only)

DESIGN DATA: NOA 08-1202.06

TAS 100

TAS 201, 202, 203

ASTM E1996, ASTM E330, ASTM E1886

This system has been tested for water infiltration resistance and is a water resistant system. This louver system has been designed in accordance with and meet the requirements of the FBC including High Velocity Hurricane Zones (HVHZ).

OPTIONS

Finishes - Baked Enamel, Kynar, Anodize

Variety of bird and insect screens

Extended Sill (Formed .063" aluminum)

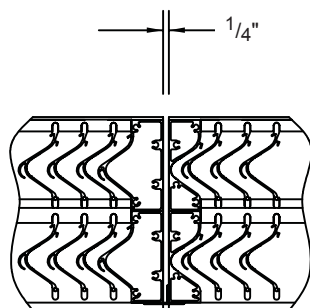
Sleeve

NOTES

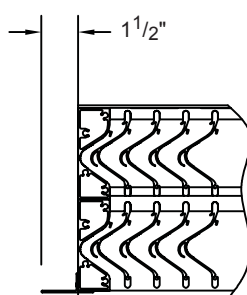
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately $\frac{1}{2}$ " undersize.
2. Louver panels may be butted together to infinite width with a maximum height of 96". Maximum single panel is 48"W x 96"H.
3. Approved opening types: wood, steel, or concrete/masonry (masonry acceptable at jambs only, head and sill must be concrete). Anchoring details may vary.
4. Units are supplied with 2" x 2" mounting angles and mounting hardware for concrete installation as a standard. Please specify if louvers are to be mounted in substrate other than concrete, OR if the installation will require a 2" x 4" mounting angle. Larger, 2" x 4" mounting angles may be required to either maintain the minimum edge distance, or to ensure that the screws don't penetrate the sill pan of the louver.
5. See installation sketches for required mounting structure.

LOUVER SIZES

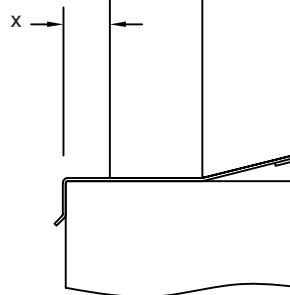
Panels	Min Panel	Max Single Panel
A820	12"W x 12"H	48"W x 96"H



Standard Exposed Vertical Mullion



Optional Flange Frame



Optional Extended Sill



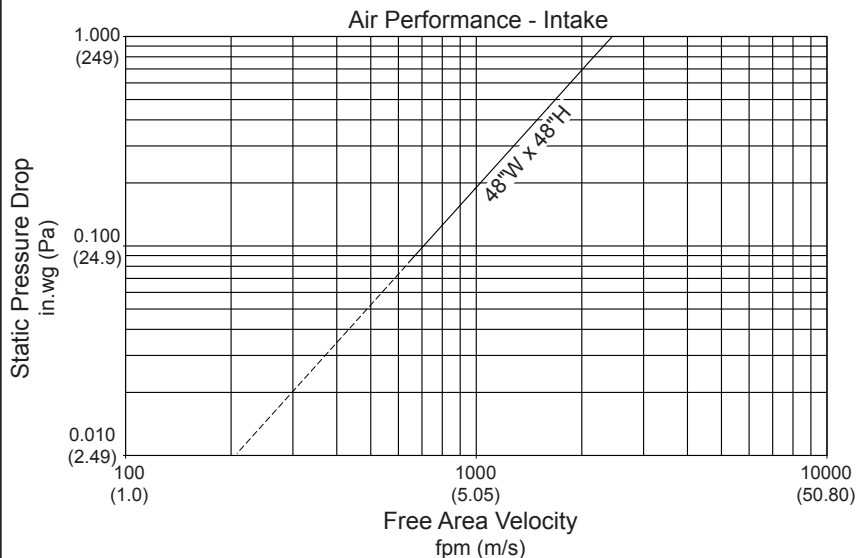
Air Balance Inc. certifies that the model A820 louver shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Water Penetration and Air Performance Ratings only.

MODEL A820

8" Deep • Fixed Chevron Blade • Hurricane Louver

Air Performance: 0.30 in.wg (74.73 Pa) at 1250 fpm (6.4 m/s) and 5862.5 scfm (2.8 scm/s)**Free Area:** 4.69 sq ft (0.435 sq m) = 29.31%

1. Test size is 48"W x 48"H (1.2m x 1.2m).
2. Ratings do not include the effect of a screen.
3. Data is at standard air density.



To determine minimum free area required for louvers:

1. Divide the required flow by the maximum recommended free area velocity.
2. Select the most desirable louver size from the free area table that meets the minimum free area that is required.
3. Compare specified performance to the certified water penetration and air performance ratings.

Example:

Given 10,000 CFM design flow

$$1. \text{ minimum free area} = \frac{\text{design flow}}{\text{maximum recommended velocity}}$$

$$\text{minimum free area} = \frac{10,000}{1000} = 10 \text{ sq.ft.}$$

2. From the free area table the required louver size 48"W x 96"H.

Free Area in sq.ft.(sq.m)

		Width			
Height		12 (305)	24 (610)	36 (914)	48 (1219)
	12 (305)	0.10 (0.009)	0.22 (0.021)	0.36 (0.033)	0.49 (0.045)
	24 (610)	0.38 (0.036)	0.88 (0.082)	1.40 (0.130)	1.90 (0.177)
	36 (914)	0.67 (0.062)	1.53 (0.142)	2.45 (0.227)	3.31 (0.308)
	48 (1219)	0.95 (0.088)	2.19 (0.203)	3.49 (0.324)	4.69 (0.435)
	60 (1524)	1.24 (0.115)	2.84 (0.264)	4.54 (0.421)	6.14 (0.571)
	72 (1829)	1.52 (0.141)	3.50 (0.325)	5.58 (0.518)	7.56 (0.702)
	84 (2134)	1.80 (0.168)	4.15 (0.386)	6.62 (0.615)	8.97 (0.833)
	96 (2438)	2.09 (0.194)	4.80 (0.446)	7.67 (0.712)	10.38 (0.965)

Blade Spacing	Rainfall Rate	Wind Velocity	Core Velocity	Air Flow	Free Area Velocity	Water Penetration Effectiveness	Discharge Loss Coefficient
1.25" (31.75mm)	8 in/hr (203 mm/hr)	50 mph (80.47 kph)	970 fpm (4.9 m/s)	10447cfm (296 m ³ /min)	2208 fpm (11.2 m/s)	100% - Class I	≤ .199 - Class 4

Wind Driven Rain Performance Test based on 39.37"W x 39.37"H (1m x 1m) Core Area Louver with 3.43 ft² (.319m²) Free Area.

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In the interest of product development, Air Balance reserves the right to make changes without notice.

P.O. Box 606 • 7435 Industrial Rd. • Florence, KY 41042 • Phone: (859) 538-3400 • Fax: (859) 647-7810

MODEL A850

8" Deep • Chevron Drainable Blade • Rain Resistant Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick; 6063-T52/T6 extruded aluminum alloy
BLADES: .081" thick; 6063-T52/T6 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" attened aluminum birdscreen
FINISH: Mill

OPTIONS

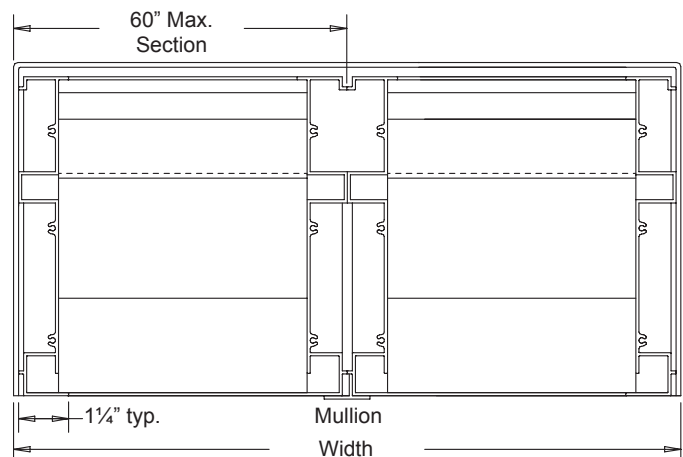
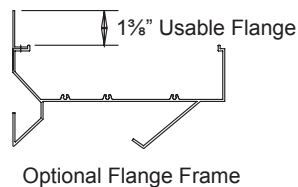
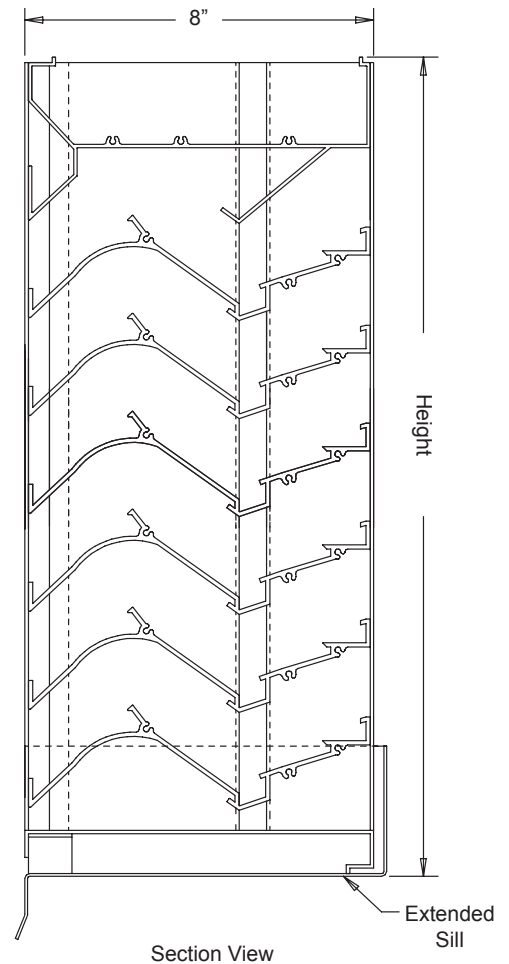
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame (3 Sides Only)
 Welded Construction
 Blank-off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 9.0 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A850	12"W x 12"H	30 sq.ft.



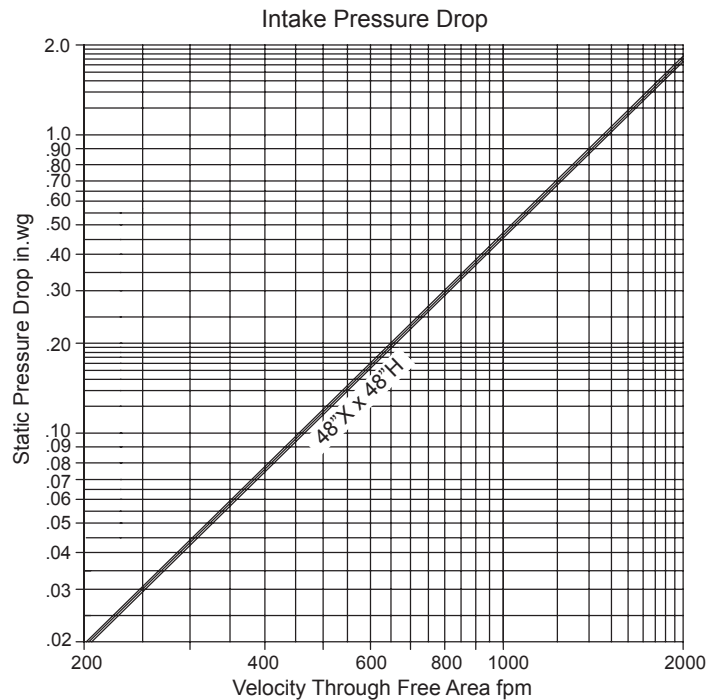
air balance

Dampers  Louvers
 UL Life Safety Products
 Division of Mestek
 Member of AMCA

MODEL A850

8" Deep • Chevron Drainable Blade • Rain Resistant Extruded Aluminum Louver

Water Penetration: 0.01 in.wg at 763 fpm free area velocity
 Pressure Drop: 0.50 in.wg at 1000 fpm and 5408 scfm
 Free Area: 9.01 sq.ft. = 56% for 48"W x 48"H test size



Free Area sq.ft.

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.30	0.49	0.68	0.87	1.06	1.25	1.44	1.63	1.82
	24"	0.83	1.36	1.89	2.42	2.95	3.48	4.01	4.54	5.07
	36"	1.37	2.24	3.12	3.99	4.86	5.74	6.61	7.49	8.36
	48"	1.86	3.05	4.24	5.43	6.62	7.82	9.01	10.20	11.39
	60"	2.39	3.92	5.45	6.98	8.52	10.05	11.58	13.11	14.64
	72"	2.93	4.80	6.68	8.55	10.43	12.30	14.18	16.05	17.92
	84"	3.42	5.62	7.81	10.00	12.19	14.38	16.57	18.76	20.95
	96"	3.96	6.49	9.02	11.55	14.08	16.61	19.14	21.67	24.20

Wind Driven Rain Test Based on a Louver having a 39"W x 39"H Core Area

Class	Effectiveness %	Maximum Allowed Penetration of Simulated Rain (gal/h/ft ²)	Free Area Velocity	cfm (48"W x 48"H)
A	99	3" Rainfall and 29 mph Wind Velocity	888fpm	8000 cfm

air balance

Dampers  Louvers
 UL Life Safety Products
 Division of Mestek
 Member of AMCA

MODEL G461

4" Deep • Formed Blade • Galvanized Steel Sand Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 18-GA formed galvanized steel channel; 4" deep

BLADES: 18-GA formed galvanized steel

ASSEMBLY: Riveted and/or welded

FINISH: Mill

SCREEN: ½" mesh x 19-GA galvanized screen in removable frame;
screen adds approximately ½" to louver depth

OPTIONS

Finishes - Baked Enamel, Kynar, Anodize

Variety of bird and insect screens

Formed Aluminum Construction

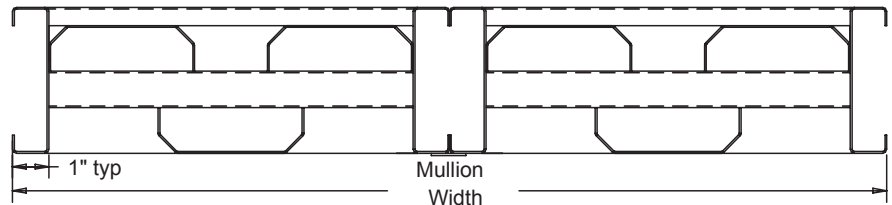
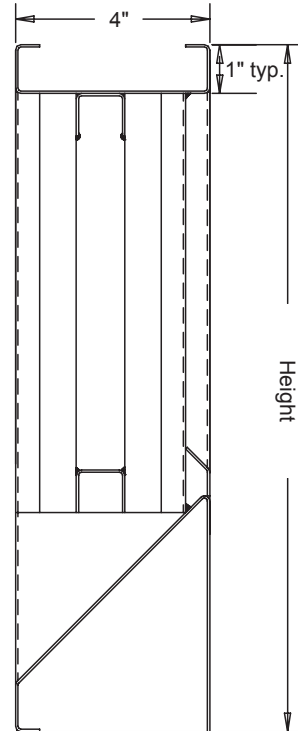
Formed Stainless Steel Construction

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ¼" undersize.
2. Sand removal efficiency approximately 90% measured during tests described in ASHRAE Standard 52-76 test method.
3. Shipping weight approximately 7 lbs./sq.ft.

LOUVER SIZES

Panels	Min Size	Max Single Panel
G461	24"W x 24"H	40 sq.ft. 96"W x 60"H 60"W x 96"H



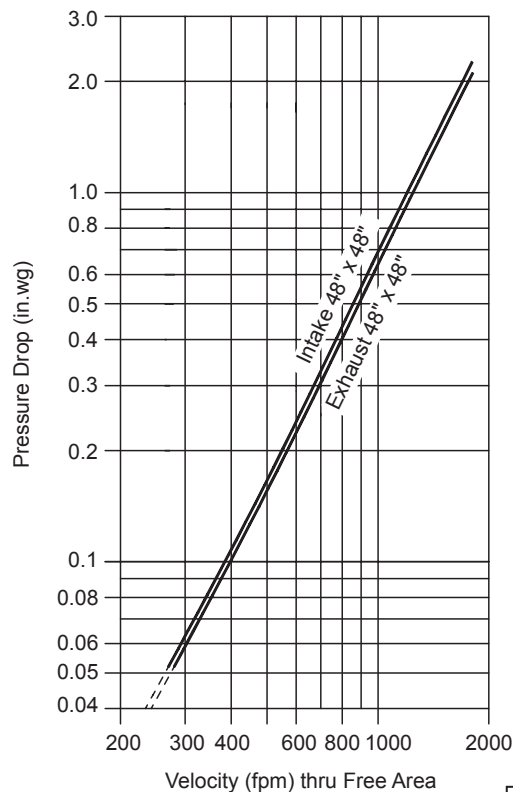
MODEL G461

4" Deep • Formed Blade • Galvanized Steel Sand Louver

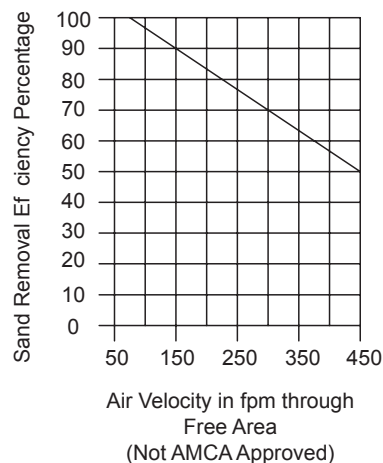
Pressure Drop: 0.70 in.wg at 1000 fpm and 5440 scfm
 Free Area: 5.44 sq.ft. = 34% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen

Pressure Drop



Sand Removal Efficiency



Designs should provide a reasonable safety factor for louver performance by selecting at some point below pressure drop or and removal requirements.

Free Area

	Width												
	24"	30"	36"	42"	48"	54"	60"	66"	72"	84"	90"	96"	
Height	24"	0.91	1.22	1.52	1.83	2.13	2.44	2.74	3.05	3.35	3.98	4.27	4.57
	30"	1.25	1.67	2.09	2.50	2.92	3.34	3.78	4.17	4.59	5.42	5.84	6.28
	36"	1.29	2.12	2.65	3.18	3.71	4.24	4.77	5.30	5.83	6.88	7.41	7.94
	42"	1.93	2.57	3.21	3.85	4.49	5.14	5.78	6.42	7.06	8.35	8.99	9.83
	48"	2.25	3.02	3.77	4.53	5.44	6.03	6.79	7.54	8.30	9.81	10.56	11.31
	54"	2.60	3.47	4.33	5.20	6.07	6.93	7.80	8.67	9.53	11.27	12.13	13.00
	60"	2.94	3.92	4.90	5.87	6.85	7.83	8.81	9.79	10.77	12.73	13.71	14.69
	66"	3.27	4.37	5.46	6.55	7.64	8.73	9.82	10.91	12.01	14.19	15.28	16.37
	72"	3.61	4.82	6.02	7.22	8.43	9.63	10.83	12.04	13.24	15.65	16.85	18.06
	78"	3.95	5.26	6.58	7.90	9.21	10.53	11.85	13.16	14.48	17.11	18.43	19.74
	84"	4.29	5.71	7.14	8.57	10.00	11.43	12.86	14.28	15.71	18.57	20.20	21.43
	90"	4.62	6.16	7.70	9.25	10.79	12.33	13.87	15.41	16.95	20.03	21.57	23.11
	96"	4.96	6.61	8.27	9.92	11.57	13.23	14.88	16.53	18.19	21.49	23.14	24.80



Air Balance Inc. certifies that the model G461 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Seal applies to Air Performance Ratings only.

In the interest of product development, Air Balance reserves the right to make changes without notice.

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Sleeve or Sleeve and Damper

Hurricane Resistant Louver Models: A320 (NOA No: 05-1206.03), A680

APPLICATION

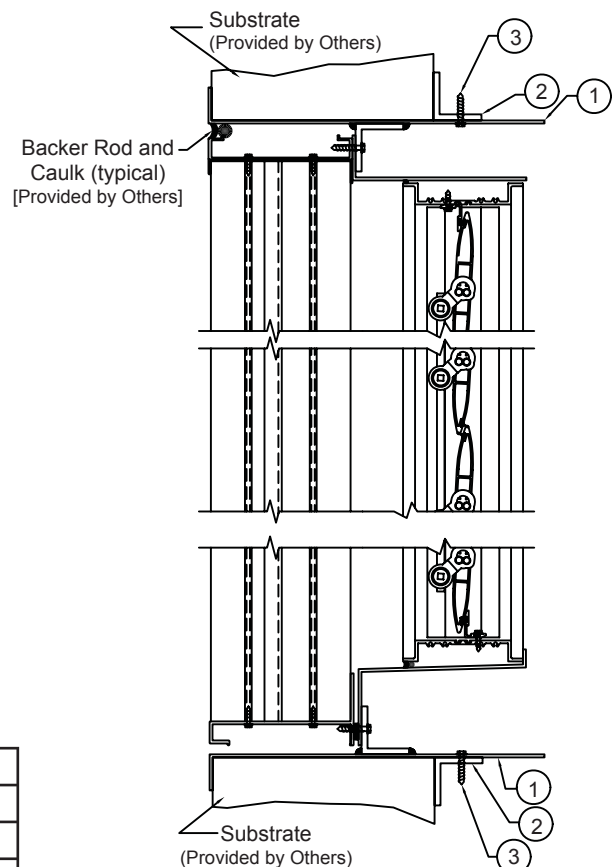
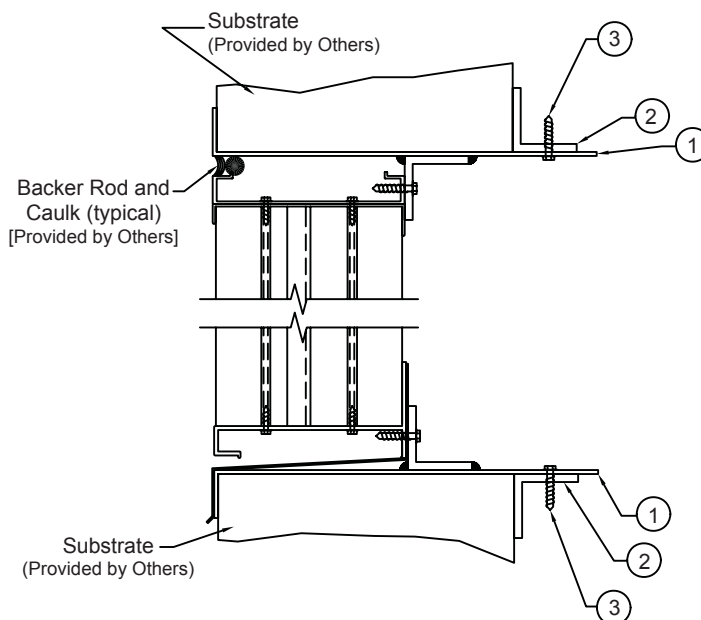
This damper/louver combination provides a Water Resistant System. The A320 (NOA No: 05.1206.03) Dade County Approved Louver requires the AFD20 damper installed with the louver panel to make it a Water Resistant System. The A680 Dade County Approved Louver is a Water Resistant System when an AFD20 or AC525/526 damper is installed with the louver panel.

PANEL SIZE

Model	Maximum Single Panel
A320	48"W x 96"H
A680	48"W x 96"H
AFD20	48"W x 96"H
AC525/526	24"W x 96"H

Notes

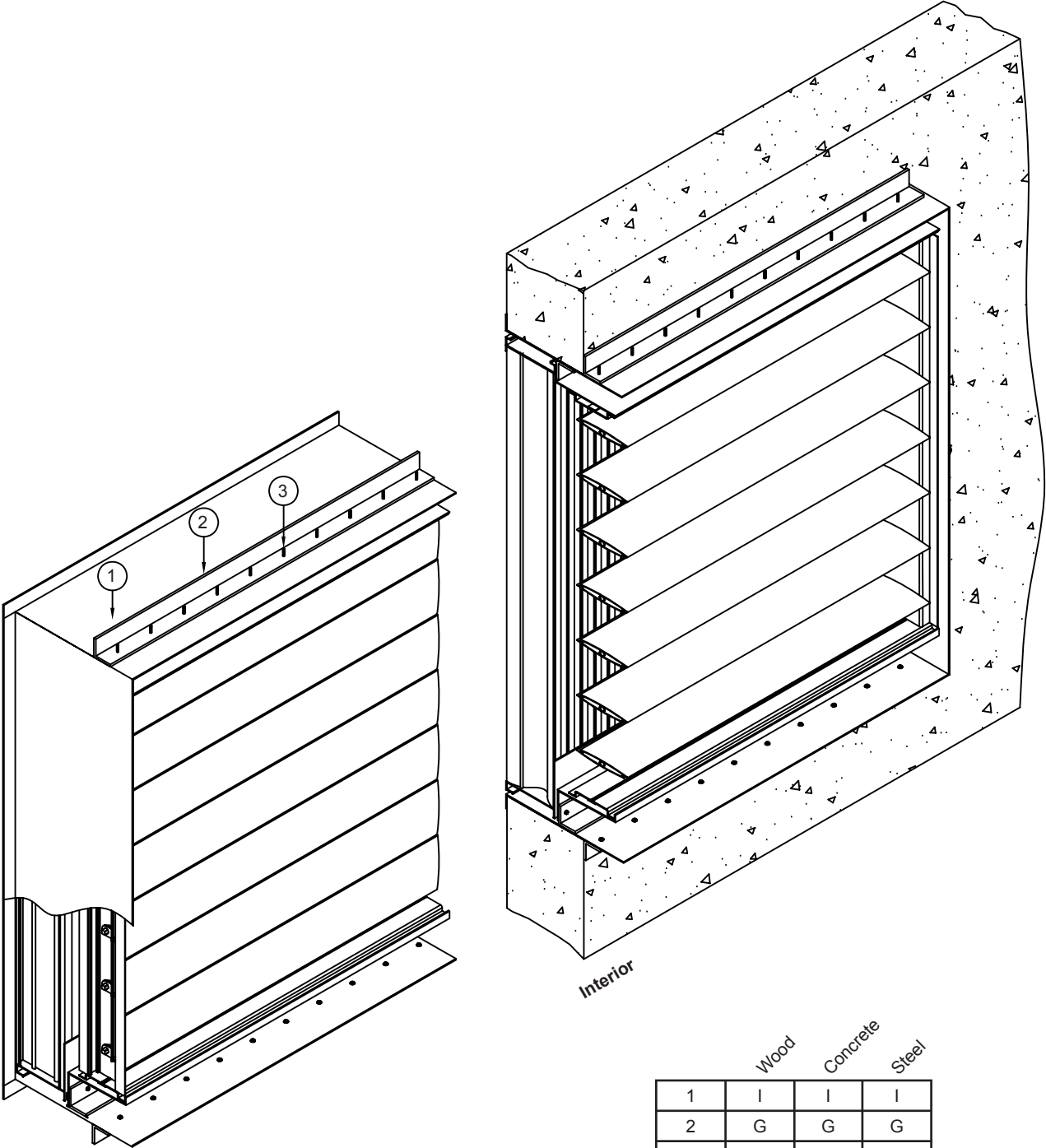
1. Number of dampers behind a louver panel is unlimited.
2. Damper mullions/seams do not have to align with louver panel seams.
3. Architectural louvers also apply.



All Fasteners Must Be A307 Plated Steel or 304 Stainless Steel	
B	#14 x 1 1/4" Tek Screw
C	#10 x 2" Wood Screw
D	#10 x 2" Long Sheet Metal Screw
E	1/4" x 1 3/4" Long Tapcon Screw
F	1/4" x 1 3/4" Bolt
G	2" x 2" 6063-T5 Extruded Aluminum Angle
H	2" x 4" 6063-T5 Extruded Aluminum Angle
I	.125" Aluminum Sleeve

	Wood	Concrete	Steel
1	I	I	I
2	G/H	G/H	G/H
3	D	D	D

Sleeve or Sleeve and Damper
Hurricane Resistant Louver Models: A320 (NOA No: 05-1206.03) , A680



Substrate removed for clarity.

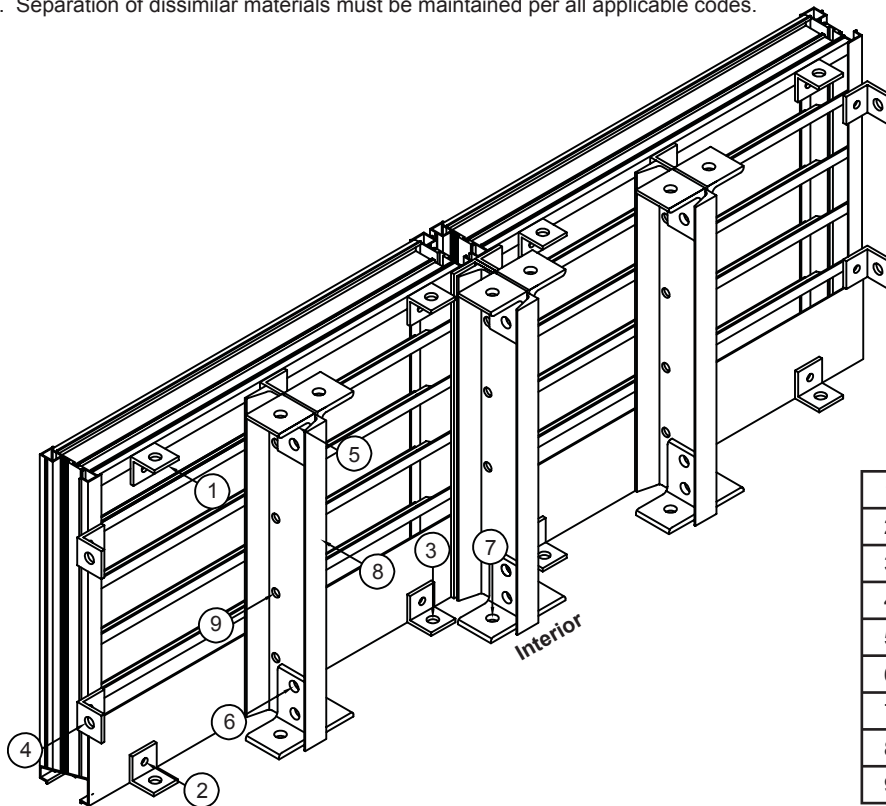
All Fasteners Must Be A307 Plated Steel or 304 Stainless Steel	
D	#10 x 2" Long Sheet Metal Screw
G	2" x 2" 6063-T5 Extruded Aluminum Angle
I	.125" Aluminum Sleeve

Standard Installation

Hurricane Louver Model: A220, X4HW, IL49

General Notes:

1. The A220, X4HW, IL49 louver system has been designed and tested in accordance with the Florida Building Code (FBC) and Protocols TAS-201, 202, and 203.
2. This system has not been tested for water infiltration resistance and is not a water resistant system.
3. It shall be the responsibility of the permit holder to verify the structural integrity of the existing structure to support the loads superimposed by the louvers.
4. Maximum single panel shall be 60"W x 96"H. The louver panels may be butted together to infinite width. The assemblies may be stacked vertically providing a structural support is designed and installed by others to support all loads transferred for the louver assembly.
5. Muller panels may be horizontally installed to an unlimited number. Vertical stacking of muller panels may occur providing structural support is designed, provided, and installed by others to support all loads transferred from the louver assembly.
6. Separation of dissimilar materials must be maintained per all applicable codes.



	Wood	Concrete	Steel - Bolted Installation	Steel - Welded Installation
1	A	A	A	B
2	C	C	C	C
3	D	E	H	K
4	D	F	H	K
5	G	G	G	G
6	H	H	H	H
7	C	E	H	L
8	I	I	I	I
9	J	J	J	J

Substrate	
Type	Requirement
Wood	Grade 2 Min. G = 0.55 Density Min.
Steel	1/8" thick A36 (36 ksi) Min.
Concrete	3000 psi Min.
Masonry	C-90 CMU Min.

All Fasteners Must Be A307 Plated Steel or 304 Stainless Steel	
A	2" x 2" x 1/4" x 2" Aluminum Clip Angle Within 4" of Jamb Ends and 8" Max O.C.
B	2" x 2" x 1/4" x 2" A36 Steel Clip Angle Within 4" of Jamb Ends and 8" Max O.C.
C	#14 Tek Screw
D	1/2" (dia.) x 2" Lag Screw with Flat Washer
E	3/8" (dia.) x 1 7/8" Sleeve Anchor with Flat Washer
F	5/8" (dia.) x 2 1/4" Sleeve Anchor with Flat Washer
G	4" x 3" x 3/8" x 2 3/4" A36 Steel Channel Mounting Angle
H	1/2" (dia.) x 2" Hex Head Bolt with Flat Washer, Lock Washer and Nut
I	C5 x 6.7 A36 Steel Channel
J	5/16" (dia.) - 18 UNC x 1 1/2" Hex Head Bolt with Flat Washer, Lock Washer, and Nut
K	Weld 3/16" Thick, 1 1/2" Long, Two Welds per Clip Angle
L	Weld - 1/4" Thick, 2" Long, One Weld per Channel Mounting Angle



MESTEK, INC.
Commercial Damper/Louver Group

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Standard Installation

Hurricane Louver Model: A220, X4HW, IL49

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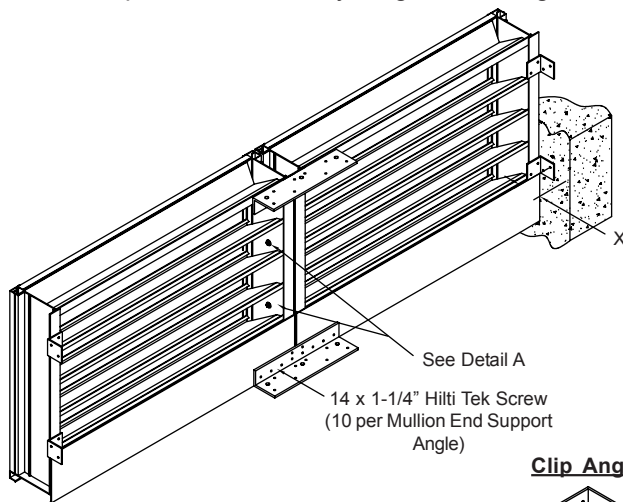
Standard Installation

Hurricane Louver Models: NOA No: 08-1224.01 - A320, X6HW, IL69

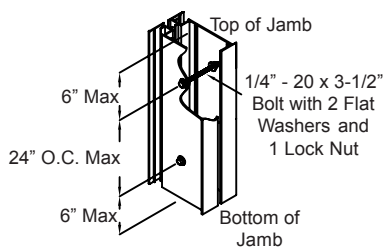
General Notes

1. The A320, X6HW, IL69 louver system has been designed and tested in accordance with the Florida Building Code (FBC) and Protocols TAS-201, 202, and 203.
2. This system has been tested for water infiltration resistance, TAS-100, and is a water resistant system when an AFD20 damper is installed with the louver panel.
3. It is the responsibility of the permit holder to verify the structural integrity of the existing structure to support the loads superimposed by the louvers.
4. Mullioned panels may be horizontally installed to an unlimited number. Vertical stacking of mullioned panels may occur providing a structural support is designed and installed by others to support all loads transferred from the louver assembly (single panels may run to unlimited height per elevation if no mullion exists).
5. Separation of dissimilar materials must be maintained per all applicable codes.

Multiple Panels Wide by Single Panel High



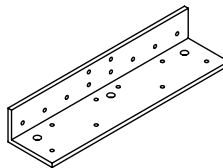
Detail A



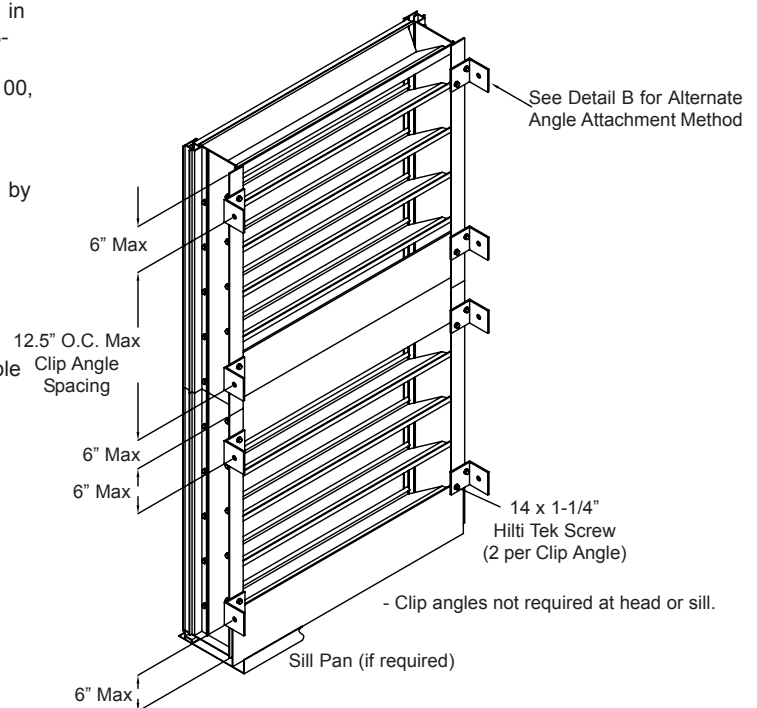
Clip Angle



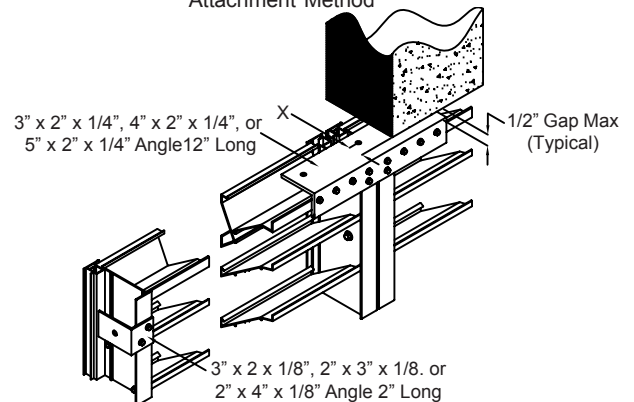
Mullion Splice Angle



Single Panel Wide by Multiple Panels High



Detail B Alternate Angle Attachment Method



Substrate		Anchor Type	Minimum Embedment	Min Distance to Edge (X)	Angle Type
Type	Requirement				
Wood	G = 0.55 Density Min	#10 Stainless Steel Screw (note 1)	1-3/8"	3/4"	A
Steel or Metal Stud	16 ga Min Fy = 33 ksi	#10 Tek Screw (note 4) 1/4" Bolt (note 2)	FULL		
C90 Concrete Block	3000 psi Min	1/4" Concrete Screw (note 3)	1-1/4"	2-1/2"	B
Concrete		3/8" Sleeve Anchor (note 5)	2-1/2"	2"	
Structural Steel	12 ga Min Fy = 36 ksi	3/8" Bolt (note 2)	FULL	3/4"	

1. Wood screws shall have minimum yield strength of Fyb - 80,000 psi
2. Bolt shall be min A307 Galvanized or 304 SS (Fv - 10,000 psi - Min)
3. Concrete screws shall be Elco Tapcons, or Hilit Kwik-Con II (Hardened Steel or S.S. Per AISI 1021 & 410)
4. All Metal stud substrate shall be minimum 16-GA Fy = 33 ksi.
5. Sleeve anchors may be galvanized, S.S. Ramset Red Head Dynabolts, or Powers Rawl Power Bolt
6. Backer rod and caulk supplied by others.
7. For special shapes consult the NOA.



MESTEK, INC.
Commercial Damper/Louver Group

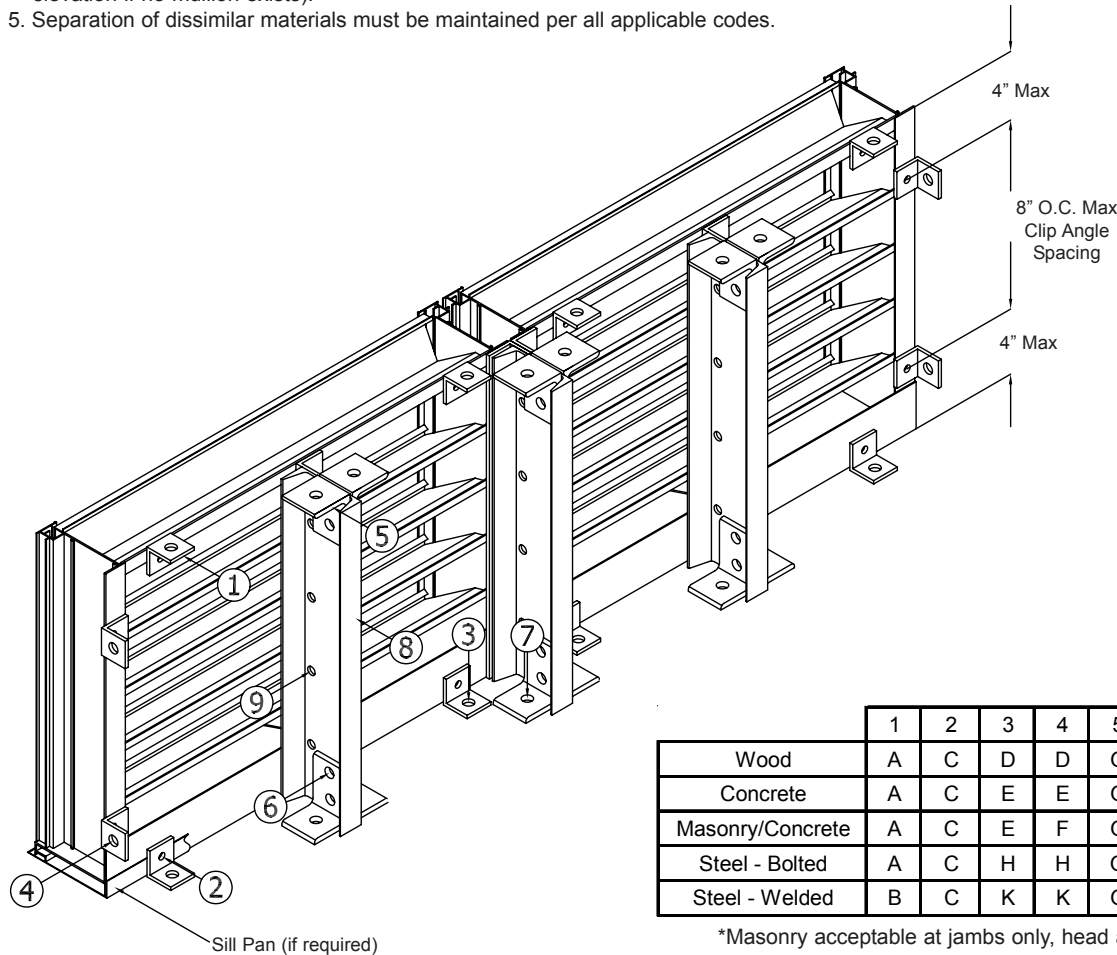
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Standard Installation

Hurricane Louver Models: NOA No: 08-1030.05 - A320, X6HW, IL69

General Notes

1. The A320, X6HW, IL69 louver system has been designed and tested in accordance with the Florida Building Code (FBC) and Protocols TAS-201, 202, and 203.
2. This system has not been tested for water infiltration resistance and is not a water resistant system.
3. It is the responsibility of the permit holder to verify the structural integrity of the existing structure to support the loads superimposed by the louvers.
4. Muller panels may be horizontally installed to an unlimited number. Vertical stacking of mulled panels may occur providing a structural support is designed and installed by others to support all loads transferred from the louver assembly (single panels may run to unlimited height per elevation if no mullion exists).
5. Separation of dissimilar materials must be maintained per all applicable codes.



	1	2	3	4	5	6	7	8	9
Wood	A	C	D	D	G	H (2x)	C (3x)	I	J
Concrete	A	C	E	E	G	H (2x)	E	I	J
Masonry/Concrete	A	C	E	F	G	H (2x)	E	I	J
Steel - Bolted	A	C	H	H	G	H (2x)	H	I	J
Steel - Welded	B	C	K	K	G	H (2x)	L	I	J

*Masonry acceptable at jambs only, head and sill must be concrete.

Substrate	
Type	Requirement
Wood	Grade 2 Min.
	G = 0.55 Density Min.
Steel	1/8\" thick A36 (36 ksi) Min.
Concrete	3000 psi Min.
Masonry	C-90 SMU Min.

All Fasteners Must Be A307 Plated Steel or 304 Stainless Steel

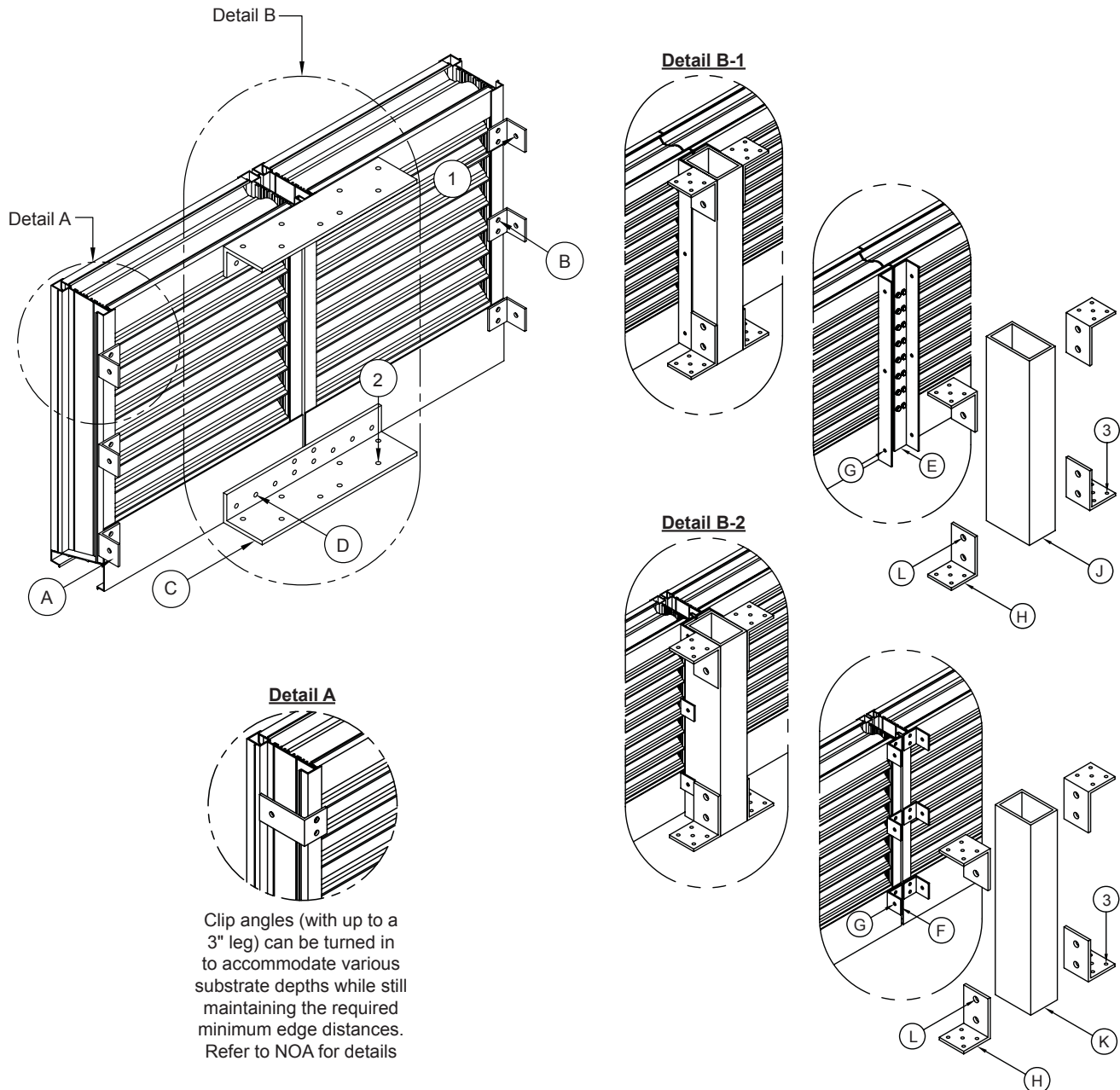
A	2"x2"x1/4"x2\" Aluminum Clip Angle Within 4\" of Jamb Ends and 8\" Max O.C.
B	2"x2"x1/4"x2\" A36 Clip Angle Within 4\" of Jamb Ends and 8\" Max O.C.
C	#14 x 1-1/4\" Tek Screw
D	Ø1/2"x2\" Lag Screw with Flat Washer
E	Ø3/8"x1-7/8\" Sleeve Anchor with Flat Washer
F	Ø5/8"x2-1/4\" Sleeve Anchor with Flat Washer
G	4"x3"x3/8"x2-3/4\" A36 Steel Channel Mounting Angle
H	Ø1/2"x2\" Hex Head Bolt with Flat Washer, Lock Washer and Nut
I	C5x6.7 A36 Steel Channel
J	Ø5/16\"-18 UNC x 1-1/2\" Hex Head Bolt with Flat Washer Lock Washer, and Nut
K	Weld -3/16\" Thick, 1-1/2\" Long, Two Welds per Clip Angle
L	Weld -1/4\" Thick, 2\" Long, One Weld per Channel Mounting Angle

Standard Installation

Hurricane Louver Model: A520

General Notes:

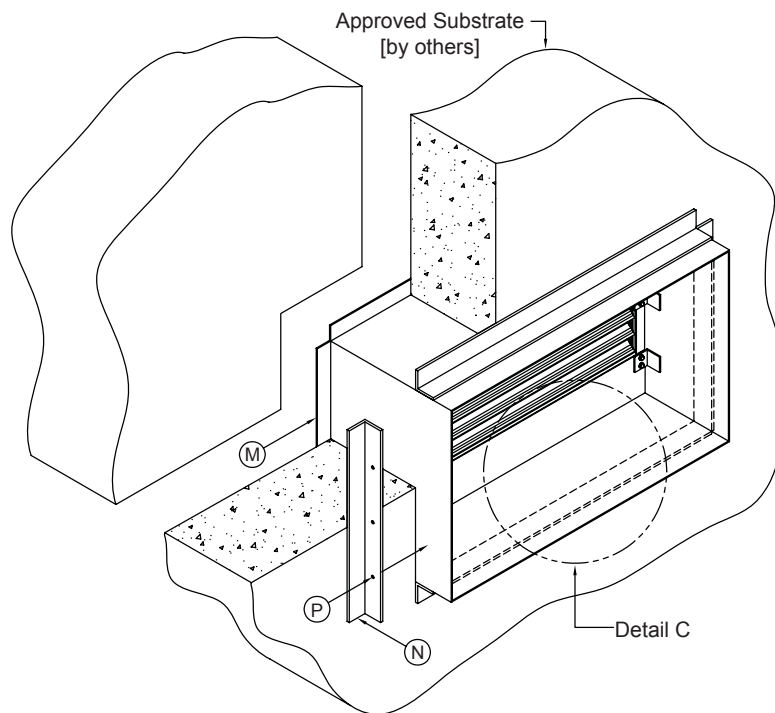
1. The A520 louver system has been designed and tested in accordance with the Florida Building Code (FBC) including the HVHZ (High Velocity and Hurricane Zones) and Protocols TAS-201, 202, and 203.
2. This system has not been tested for water infiltration resistance and is not a water resistant system.
3. It shall be the responsibility of the permit holder to verify the structural integrity of the existing structure to support the loads superimposed by the louvers.
4. Maximum single panel shall be 60"W x 96"H. The louver panels may be butted together to infinite width. Single panel wide assemblies may be stacked vertically providing a structural support is designed and installed by others to support all loads transferred for the louver assembly.
5. Separation of dissimilar materials must be maintained per all applicable codes.



Standard Installation

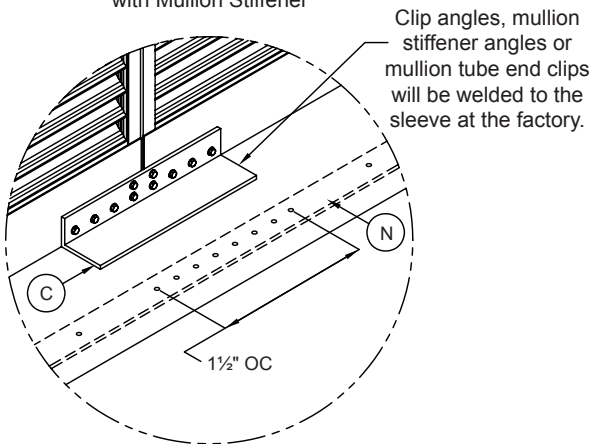
Hurricane Louver Model: A520

Optional Sleeve Installation



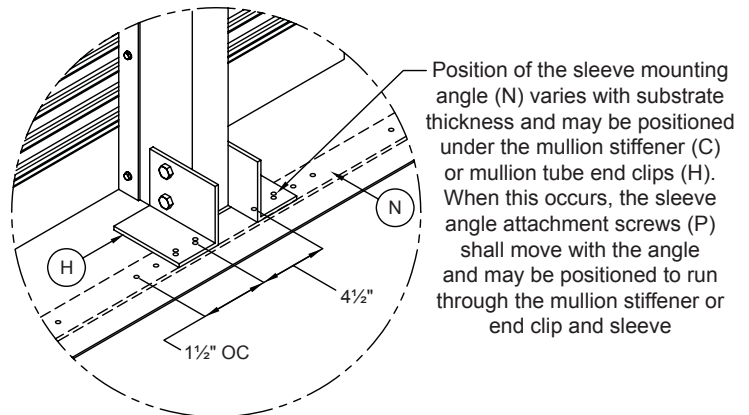
Detail C-1

Sleeve mounting Angle Fastener Pattern with Mullion Stiffener



Detail C-2

Sleeve Mounting Angle Fastener Pattern with Mullion Tube



Standard Installation

Hurricane Louver Model: A520

Approved Substrates						
	Wood (1)	Metal Stud (2)	Structural Steel (3)	Aluminum (4)	Block (5)	Concrete (6)
1	W	X	X	X	Y	Y
2	W	X	X	X	-	Y
3	W (11)	X	X	X	-	Z

All Fasteners Must Be A307 Plated Steel or 304 Stainless Steel	
A	Perimeter clip mounting angle; 4" from ends max, spacing per windload requirement [provided] (7)
B	1/4-14 x 3/4" self tapping/drilling screw; 2 per clip angle [provided]
C	Mullion splice angle; 2 per standard visible vertical mullion [provided if applicable]
D	1/4-14 x 3/4" self tapping/drilling screw; 10 per splice angle [provided]
E	Full length architectural vertical mullion angle [attached at factory if applicable] (9)
F	Reinforced visible vertical mullion clip mounting angle; 5" from ends max, 8" on centers
G	1/4-14 x 3/4" self tapping/drilling screw; 8" on centers [provided]
H	Mullion tube end clip; 4 per mullion [provided with architectural or reinforced vertical mullions] (11)
J	3" x 5" x 1/4" aluminum mullion tube [provided with architectural mullions]
K	3" x 4" x 3/16" aluminum mullion tube [provided with reinforced mullions] (10)
L	1/2" x 5" A307 hex head plated or stainless steel bolt with nut and washer; 4 per mullion [provided if applicable]
M	1/8" thick aluminum sleeve with 1/2" integral angle [optional] (12)
N	2" x 2" x 1/4" Sleeve mounting angle, entire perimeter [provided if applicable]
P	1/4-14 x 3/4" self tapping/drilling screw; within 4" of corners and sleeve splices, 8" max on centers, clustered at mullions [provided if applicable] (13)
W	No. 14 SMS or wood screw, 1-3/8" min embed, 3/4" min edge distance [by others]
X	1/4-14 grade 5 self tapping/drilling screw, full embed, 1/2" min edge distance [by others]
Y	1/4" concrete screw, 1-1/2" min embed {concrete} or 1-1/4" min embed {block-sides only}, 2" min edge distance [by others] (8)
Z	1/2" Hilti stainless steel Kwick Bolt 3, 1 per angle, 3-1/2" min embed, 3" min edge distance [by others]

Notes

- (1) Wood frame or buck, minimum Grade 3 & G=0.55
- (2) Minimum 16-GA 33ksi metal stud
- (3) Minimum 1/8" thick A36 steel
- (4) Minimum 1/8" thick 6063-T5 aluminum
- (5) Minimum C-90 CMU, applicable at sides only
- (6) Minimum 3000 psi concrete
- (7) 1-1/2" x 1-1/2" (to 3" max) x 1/8" angle, 1-1/2" leg shall be secured to the louver jamb
- (8) Concrete screws shall be Elco Ultracons, ITW Ramset/Red Head Tapcons or Hilti Kwick-Con II (hardened or stainless steel)
- (9) Full length angles are optional for reinforced visible vertical mullions and/or perimeter mounting
- (10) 3" x 4" x 1/4" aluminum mullion tubes optional for higher windloads
- (11) 5 screws per angle required for wood substrate, 4 screws per angle required for all other substrates
- (12) Louvers that are able to be shipped as a single panel will be factory installed in the sleeve. If louver is a multiple panel assembly, components will be shipped loose in a 'knock-down' fashion for field assembly.
- (13) See Detail C-1 and C-2 for mullion cluster patterns

Standard Installation

Hurricane Louver Model: A520

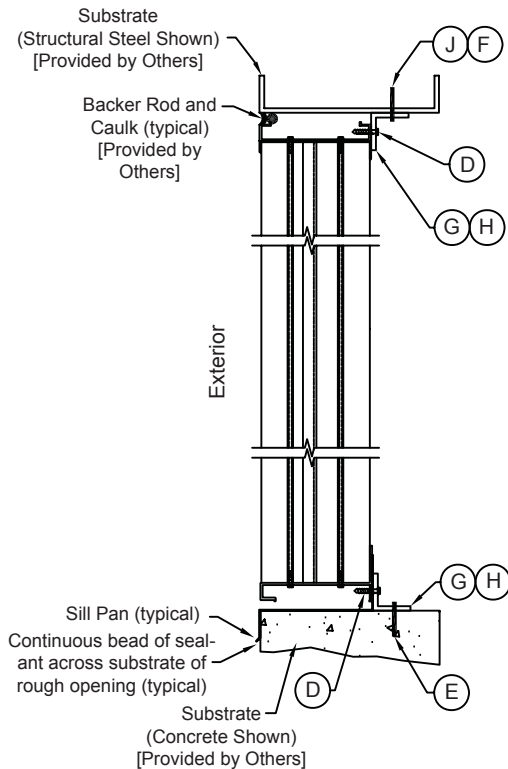
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Standard Installation

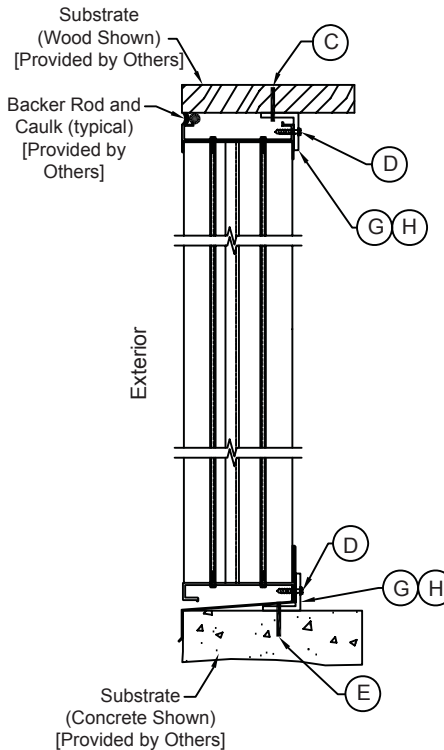
Hurricane Louver Model: A680, X6VW, IL69

General Notes:

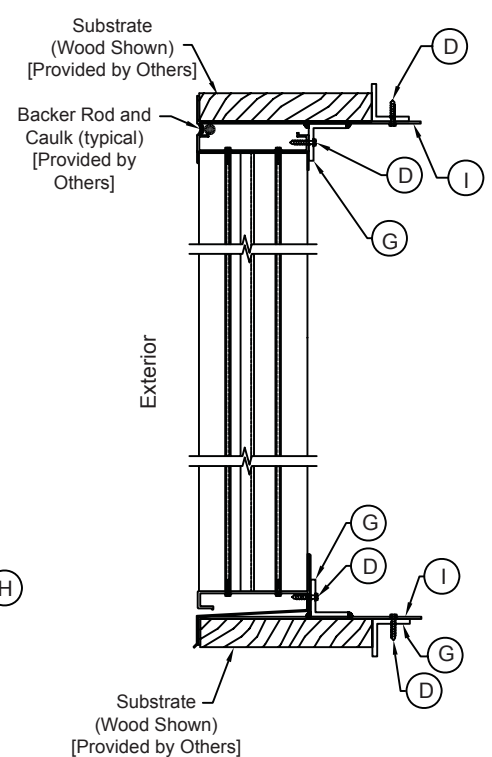
1. The A680, X6VW, IL68 louver system has been designed and tested in accordance with the Florida Building Code (FBC) and Protocols TAS-201, 202, and 203.
2. The A680, X6VW, IL68 louver system is qualified for "Enhanced Protection" for Essential Facilities Applications via the successful testing of Large Missile Test at 80 F/S) and cyclic load tests as specified by ASTM 1886/1996.
3. This system has been tested for water infiltration resistance, TAS-100, and is a water resistant system when an approved damper is installed with the louver panel (see Approved Dampers Chart below).
4. It shall be the responsibility of the permit holder to verify the structural integrity of the existing structure to support the loads superimposed by the louvers.
5. Louver panels may be butted together to infinite width with a maximum height of 96". Maximum single panel shall be 48"W x 96"H.
6. Muller panels may be horizontally installed to an unlimited number.
7. Separation of dissimilar materials must be maintained per all applicable codes.
8. Backer Rod and caulk are provided by others and required at all louver (sleeve) to substrate seams as well as all vertical mullions.



Mounting Angle Leg Out



Mounting Angle Leg In



Sleeve Mounting Angle Leg Out

Maximum Allowable Design Wind Pressure			
Fastener C/C (X)	Fastener End Distance (Y)	Positive	Negative
4"	6"	150 PSF	150 PSF
8"	4"	75 PSF	75 PSF
12"	2"	50 PSF	50 PSF

Substrate Type	Requirement
Wood	Min. Grade 2 G = 0.55 Density Min
Steel or Metal Stud	16-GA Min Fy = 33 ksi
Concrete	3000 psi Min
Structural Steel	12-GA Min Fy = 36 ksi

Approved Dampers				
Division	Parallel		Opposed	
ABI	AC525	AFD20	AC526	AFD20
Cesco	AAAA	AFD20	AAAB	AFD20
L&D	A28	AFD20	A29	AFD20

Fastener Schedule					
Anchor Type	Notes	Substrate	Minimum Embedment	Minimum Edge Distance	
E 1/4" Concrete Screw	(1)	Concrete	1 1/4"	2"	
F 1/4" Bolt	(2)	Steel or Metal Stud	Full	3/4"	
B #10 Tek Screw	(4)	Metal Stud	Full	3/4"	
D #10 Sheet Metal Screw	(3)	Sleeve	Full	3/4"	
C #10 S.S Wood Screw	(3)	Wood	1 1/4"	3/4"	
J #14 Tek Screw	(4)	Steel	Full	3/4"	

Material Schedule	
G	2" x 2" 6063-T5 Extruded Aluminum Angle
H	2" x 4" 6063-T5 Extruded Aluminum Angle
I	5052-H32 x .125" Aluminum Sleeve

- (1) Concrete screws shall be ITW Ramset/Red Head or Elco Tapcons, Hilti Kwik-Con II or Powers Rawl Tapper. (Hardened Steel or S.S. per AISI 1021 & 410)
- (2) Bolt shall be minimum A307 galvanized or 304 S.S (Fv = 10,000 PSI MIN.)
- (3) SMS/Wood screws shall have minimum yield strength of Fyb = 80,000 PSI
- (4) Self tapping screws shall be corrosion resistant minimum SAE. Grade 2 Steel or minimum alloy group 1, 2 and 3 condition "A" Stainless Steel

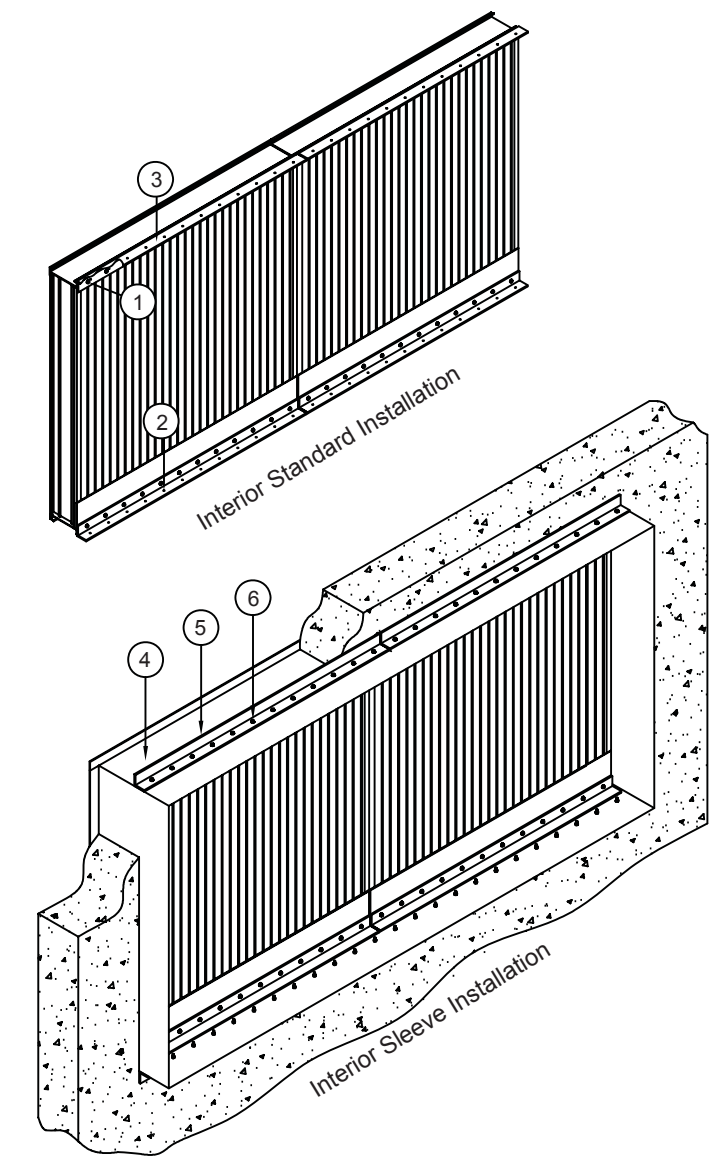


MESTEK, INC.
Commercial Damper/Louver Group

P.O. Box 606 • 7435 Industrial Rd. • Florence, KY 41042 • Phone: (859) 538-3400 • Fax: (859) 647-7810

Standard Installation

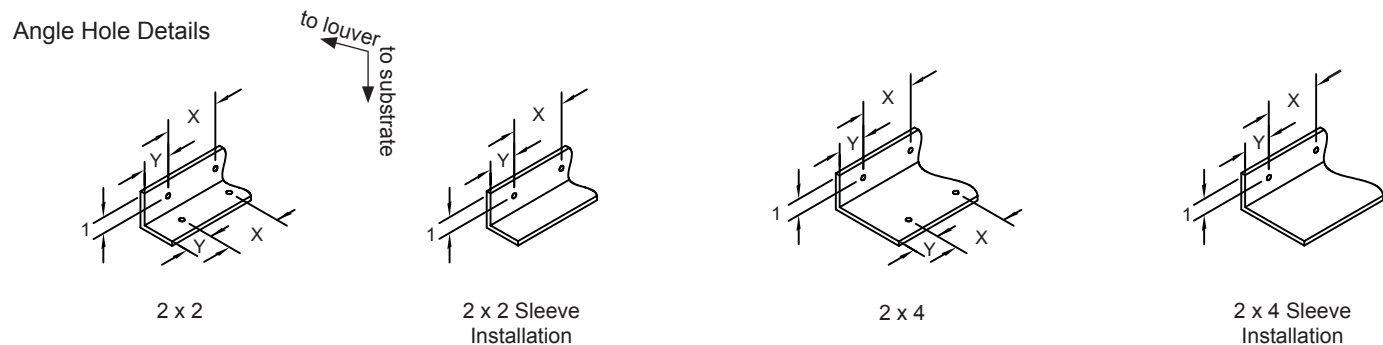
Hurricane Louver Model: A680, X6VW, IL69



	Wood	Concrete	Steel
Standard Installation			
1	B	B	B
2	C	E	J/F
3	G/H	G/H	G/H
Sleeve Installation			
4	I	I	I
5	G/H	G/H	G/H
6	C	C	C

Louver Installation Key	
B	#10 Tek Screw
C	#10 S.S. Wood Screw
D	#10 Sheet Metal Screw
E	1/4" Concrete Screw
F	1/4" Bolt
G	2" x 2" 6063-T5 Extruded Aluminum Angle
H	2" x 4" 6063-T5 Extruded Aluminum Angle
I	5-52-H32 x .125" Aluminum Sleeve

Isometric views above depict interior mounting details as shown on front page illustrations.

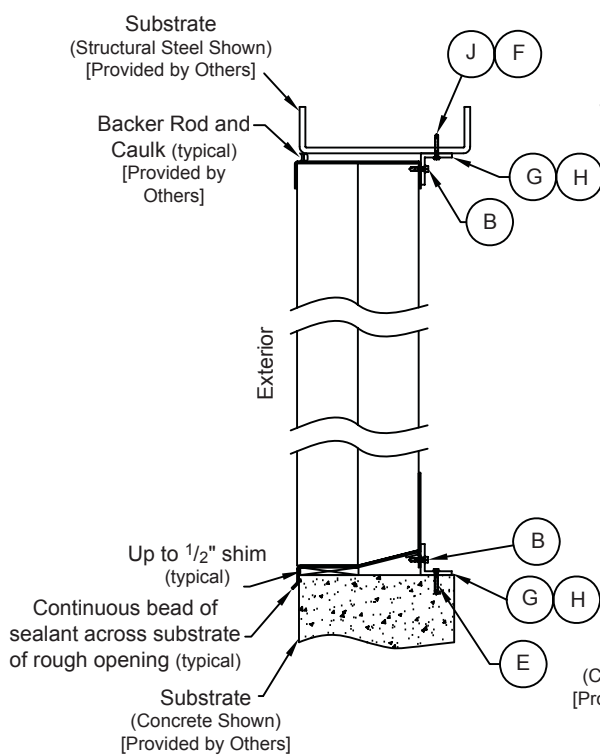


Standard Installation

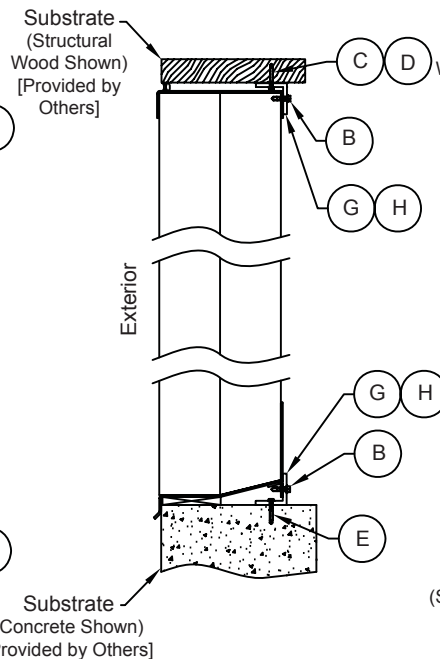
Hurricane Louver Model M8 - NOA 08-1202.06: A820, A8VB, IL82

General Notes:

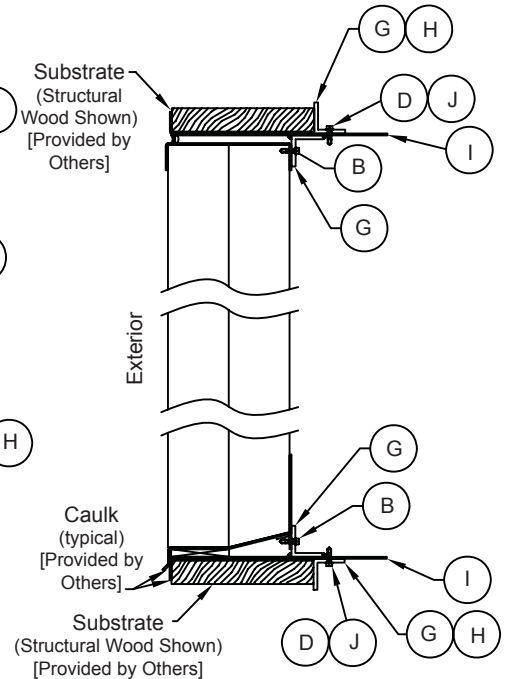
1. The M8 louver system has been designed and tested in accordance with the Florida Building Code (FBC) and Protocols TAS-201, 202, and 203.
2. The M8 louver system is qualified for "Enhanced Protection" for Essential Facilities Applications via the successful testing of Large Missile Test (at 80 F/S) and cyclic load tests as specified by ASTM 1886/1996.
3. The M8 louver system has been tested for water infiltration resistance, TAS-100 criteria, and is a water resistant system.
4. It shall be the responsibility of the permit holder to verify the structural integrity of the existing structure to support the loads superimposed by the louvers.
5. Louver panels may be butted together to infinite width with a maximum height of 96". Maximum single panel shall be 48"W x 96"H.
6. Muller panels may be horizontally installed to an unlimited number. Vertical stacking of muller panels is not part of this approval.
7. Separation of dissimilar materials must be maintained per all applicable codes.
8. Backer Rod and caulk are provided by others and required at all louver (sleeve) to substrate seams as well as all vertical mullions.



Mounting Angle Leg Out



Mounting Angle Leg In



**Sleeve Mounting
Angle Leg Out**

Maximum Allowable Design Wind Pressure			
Fastener C/C (X)	Fastener End Distance (Y)	Positive	Negative
4"	2"	150 PSF	150 PSF
8"	4"	75 PSF	75 PSF
12"	6"	50 PSF	50 PSF

Substrate Type	Requirement
Wood	Min. Grade 3 G = 0.55 Density Min
Steel or Metal Stud	16-GA Min Fy = 33 ksi
Concrete	3000 psi Min
Concrete Block	C-90 CMU/3000 psi Concrete
Structural Steel	12-GA Min Fy = 36 ksi

Fastener Schedule					
Anchor Type	Notes	Substrate	Minimum Embedment	Minimum Edge Distance	
E 1/4" Concrete Screw	(1)	Concrete	1 1/4"	2"	
F 1/4" - GR. 5 - Bolt	(2)	Steel or Metal Stud	Full	1 1/2"	
B #14 Tek Screw	(4)	Metal Stud	Full	1 1/2"	
D #10- GR. 5 - Sheet Metal Screw	(3)	Sleeve	Full	1 1/2"	
C #10 - GR 5. - S.S Wood Screw	(3)	Wood	1 1/4"	3/4"	
J #10 - GR. 5 - Tek Screw	(4)	Steel	Full	1 1/2"	

Material Schedule	
G	2" x 2" 6063-T5 Extruded Aluminum Angle
H	2" x 4" 6063-T5 Extruded Aluminum Angle
I	5052-H32 x .125" Aluminum Sleeve

- (1) Concrete screws shall be ITW Ramset/Red Head or Elco Tapcons, Hilti Kwik-Con II or Powers Rawl Tapper. (Hardened Steel or S.S.)
- (2) Bolt shall be minimum A307 galvanized or 304 S.S (Fv = 10,000 PSI MIN.)
- (3) Screws shall have minimum yield strength of Fyb = 80,000 PSI
- (4) Tek Screws shall have minimum yield strength of Fyb = 80,000 PSI



Standard Installation

Hurricane Louver Model M8 - NOA 08-1202.06: A820, A8VB, IL82

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Dampers  Louvers
UL Life Safety Products

Extruded Aluminum Louvers

Extruded Stationary Louvers

- A150 — 1-1/2" Deep, 30° Baffle Blade, Extruded Aluminum, Stationary Louver
- A245 — 2" Deep, 45° Baffle Blade, Extruded Aluminum, Stationary Louver
- A258 — 2" Deep, 45° Drainable Blade, Extruded Aluminum, Stationary Louver
- A281 — 2" Deep, Inverted "Y" Blade, Extruded Aluminum, Stationary Louver
- A424 — 4" Deep, 45° Dual Drainable Blade, Extruded Aluminum, Stationary Louver
- A430 — 4" Deep, 37° Straight Blade, Extruded Aluminum, Stationary Louver
- A435 — 4" Deep, 37° Drainable Blade, Extruded Aluminum, Stationary Louver
- A440 — 4" Deep, 30° Baffle Blade, Extruded Aluminum, Stationary Louver
- A445 — 4" Deep, 45° Drainable Blade, Extruded Aluminum, Stationary Louver
- A455 — 4" Deep, 45° Straight Blade, Extruded Aluminum, Stationary Louver
- A465 — 4" Deep, 45° Baffle Blade, Extruded Aluminum, Stationary Louver
- A481 — 4" Deep, Inverted "Y" (Horizontal) Blade, Extruded Aluminum, Stationary Louver
- A482 — 4" Deep, Inverted "Y" (Vertical) Blade, Extruded Aluminum, Stationary Louver
- A485 — 4" Deep, Chevron (Horizontal) Blade, Extruded Aluminum, Stationary Louver
- A486 — 4" Deep, Chevron (Vertical) Blade, Extruded Aluminum, Stationary Louver
- A500 — 5" Deep, Chevron Blade, Extruded Aluminum, Stationary Louver
- A634 — 6" Deep, 35°/42° Drainable Blade, Extruded Aluminum, Stationary Louver
- A635 — 6" Deep, 35°/42° Drainable Blade, Extruded Aluminum, Stationary Louver
- A645 — 6" Deep, 45° Drainable Blade, Extruded Aluminum, Stationary Louver
- A650 — 6" Deep, Drainable Blade, Extruded Aluminum, Stationary Louver
- A655 — 6" Deep, 45° Non-Drainable Blade, Extruded Aluminum, Stationary Louver
- A6DPH — 6" Deep, "Drainable" Blade, High Performance, Extruded Aluminum, Stationary Louver

Stationary Brick Vents

- BV15 — 1" Deep, 45°, Standard Blade, Flange Frame, Extruded Aluminum Brick Vent
- BV40 — 4" Deep, 45°, Standard Blade, Channel Frame, Extruded Aluminum Brick Vent

Extruded Adjustable Louvers

- A445A — 4" Deep, Drainable Blade, Extruded Aluminum, Adjustable Louver
- A455A — 4" Deep, Non-Drainable Blade, Extruded Aluminum, Adjustable Louver
- A488A — 4" Deep, Non-Drainable Blade, Extruded Aluminum, Adjustable Louver
- A635A — 6" Deep, Drainable Blade, Extruded Aluminum, Adjustable Louver
- A645A — 6" Deep, Drainable Blade, Extruded Aluminum, Adjustable Louver
- A655A — 6" Deep, Non-Drainable Blade, Extruded Aluminum, Adjustable Louver

Extruded Combination Louvers

- A454C — 4" Deep, Dual Drainable Blade, Extruded Aluminum, Combination Louver
- A455I/A455E — 4" Deep, Non-Drainable Blade, Extruded Aluminum, Intake/Exhaust, Louver
- A635AF — 6" Deep, Airfoil Drainable Blade, Extruded Aluminum, Combination Louver
- A665C — 6" Deep, Drainable Blade, Extruded Aluminum, Combination Louver
- A681C — 6" Deep, Non-Drainable Blade, Extruded Aluminum, Combination Louver

Vision/Sun Screens

- AIS4 — 4" Deep, Extruded Aluminum, Inverted Equipment Screen
- ASV — 4" Deep, Extruded Aluminum, Equipment Screen
- ASY — 4" Deep, Extruded Aluminum, Equipment Screen
- GS1 — 1"-6" Deep, Modular, Extruded Aluminum, Grille Screen
- GS2 — 2"-6" Deep, Angular Horizontal Bar, Extruded Aluminum, Grille Screen
- GS2C — 2"-6" Deep, Angular Continuous Line, Extruded Aluminum, Grille Screen
- GS3C — 2"-6" Deep, Solar Angular Continuous Line, Extruded Aluminum, Grille Screen

Supplemental Info — Special Shapes
Supplemental Info — Color Chart

Phone: 859-538-3400 Fax: 859-647-7810
PO Box 606 • 7435 Industrial Road Florence, KY 41042
DAMPERS • LOUVERS • DUCT DOORS • VENTILATORS • ROOF CURBS

air balance

Dampers  Louvers
UL Life Safety Products

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MODEL A150

1½" Deep • 30° Baffle Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .063" thick; 6063-T6/T52 extruded aluminum alloy
BLADES: .063" thick; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: ½" x .051" attened aluminum birdscreen
FINISH: Mill

OPTIONS

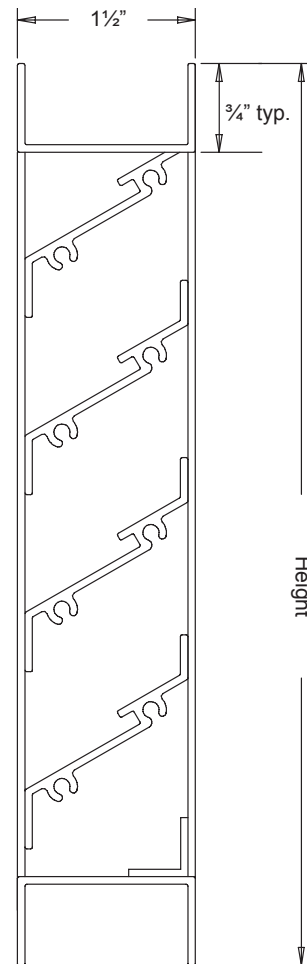
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 ¾" Usable Flange Frame
 Welded Construction
 Blank-off Panels

NOTES

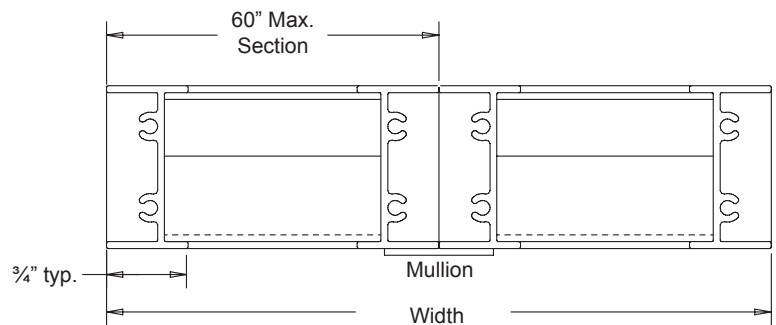
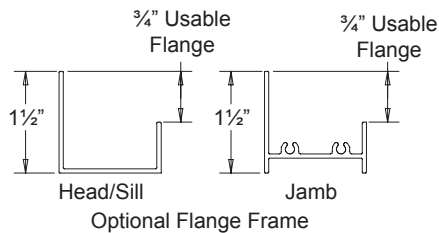
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undercut.
2. Shipping weight approximately 3.8 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A150	12"W x 12"H	60"W x 96"H



Section View



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MODEL A150

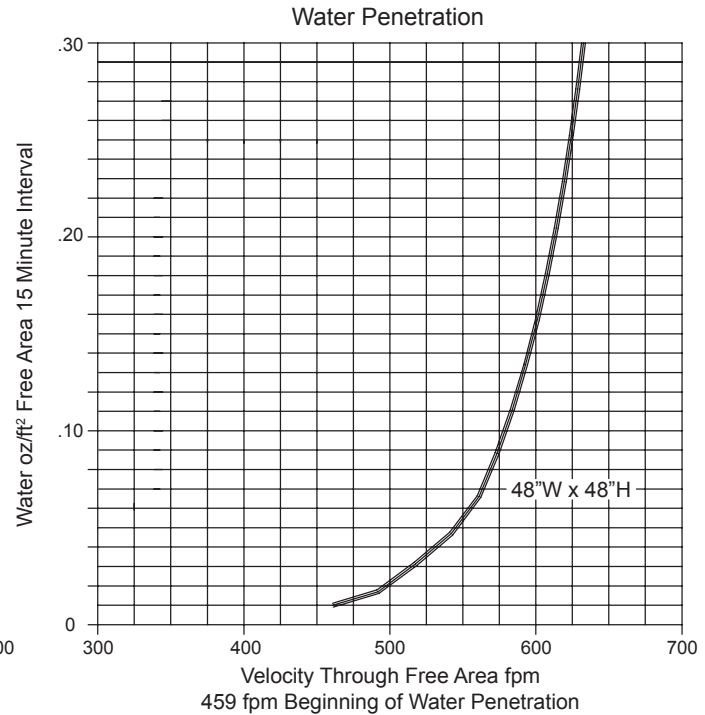
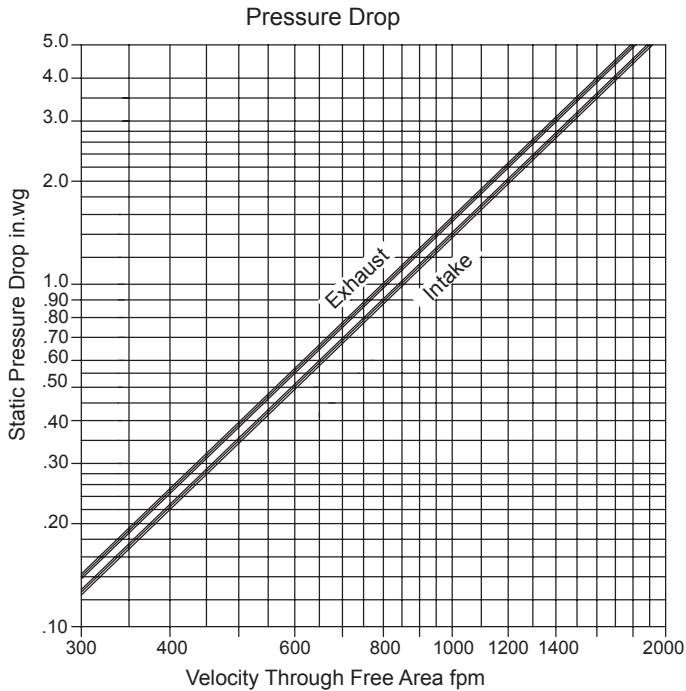
1½" Deep • 30° Baffle Blade • Extruded Aluminum Louver

Water Penetration: 400 fpm recommended maximum free area velocity

Pressure Drop: 0.10 in.wg at 800 fpm and 5896 scfm

Free Area: 7.37 sq.ft. = 46% for 48"W x 48"H test size

Ratings do not include the effect of a birdscreen.



Free Area sq.ft.

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.33	0.52	0.71	0.90	1.09	1.28	1.47	1.66	1.85
	24"	0.78	1.22	1.66	2.11	2.55	2.99	3.44	3.88	4.32
	36"	1.22	1.92	2.61	3.31	4.01	4.70	5.40	6.10	6.80
	48"	1.66	2.61	3.56	4.52	5.47	6.42	7.37	8.32	9.27
	60"	2.11	3.31	4.52	5.72	6.92	8.13	9.33	10.54	11.74
	72"	2.55	4.01	5.47	6.93	8.38	9.84	11.30	12.76	14.22
	84"	3.00	4.71	6.42	8.31	9.84	11.55	13.27	14.98	16.69
	96"	3.44	5.40	7.37	9.34	11.30	13.27	15.23	17.20	19.16

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MODEL A245

2" Deep • 45° Baffle Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .064" thick nominal; 6063-T6/T52 extruded aluminum alloy
BLADES: .064" thick nominal; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

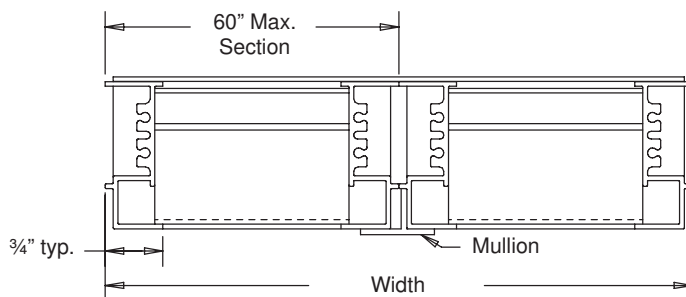
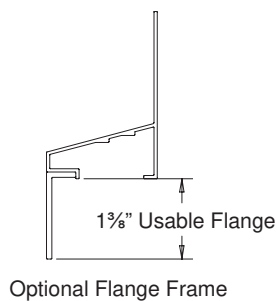
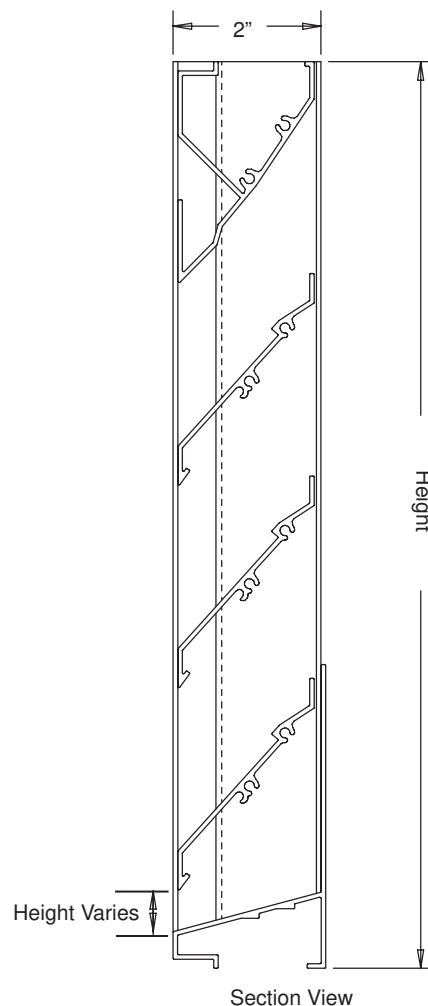
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame (Front Face Only)
 Continuous Line Construction

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 3.3 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A245	12"W x 12"H	60"W x 96"H



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MODEL A245

2" Deep • 45° Baffle Blade • Extruded Aluminum Louver

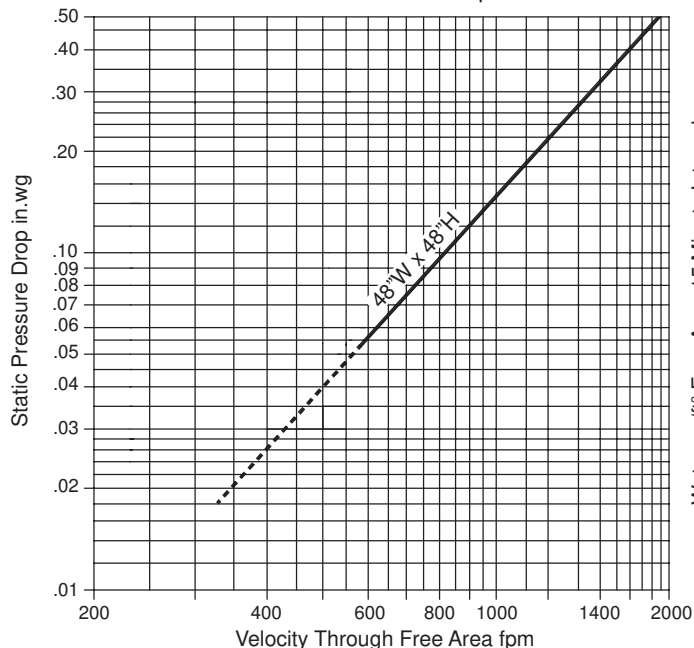
Water Penetration: At 700 fpm recommended maximum free area velocity

Pressure Drop: 0.085 in.wg at 748 fpm and 5408 scfm

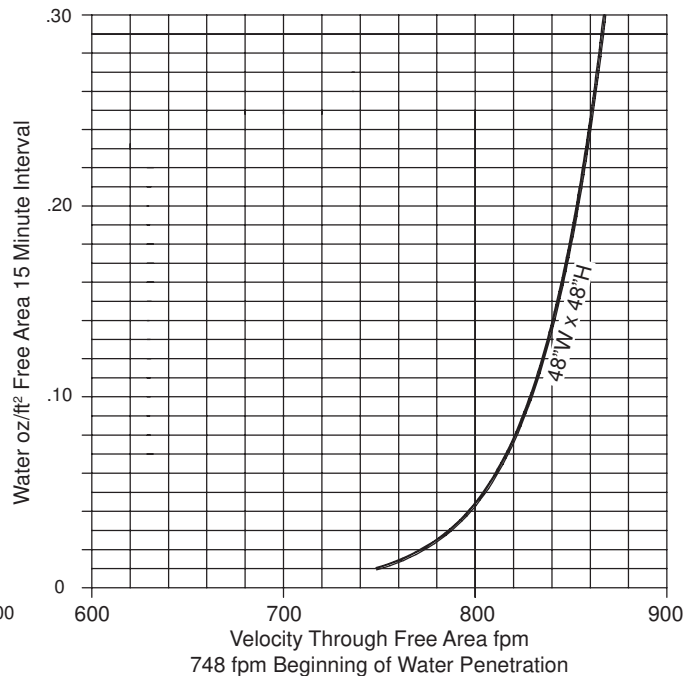
Free Area: 7.23 sq.ft. = 45% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.

Intake Pressure Drop



Water Penetration



Free Area sq.ft

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.28	0.44	0.60	0.76	0.92	1.08	1.24	1.40	1.56
	24"	0.78	1.23	1.69	2.14	2.59	3.04	3.49	3.94	4.39
	36"	1.19	1.87	2.55	3.23	3.91	4.60	5.28	5.96	6.64
	48"	1.63	2.56	3.50	4.43	5.37	6.30	7.23	8.17	9.11
	60"	2.05	3.23	4.41	5.59	6.77	7.95	9.14	10.32	11.50
	72"	2.45	3.86	5.27	6.68	8.09	9.50	10.91	12.32	13.73
	84"	2.94	4.63	6.32	8.01	9.70	11.39	13.08	14.77	16.46
	96"	3.36	5.29	7.22	9.15	11.08	13.00	14.93	16.86	18.79



ABI certifies that the Model A245 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Water Penetration Ratings.

air balance

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MODEL A258

2" Deep • 45° Drainable Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .064" thick nominal; 6063-T6/T52 extruded aluminum alloy
BLADES: .064" thick nominal; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

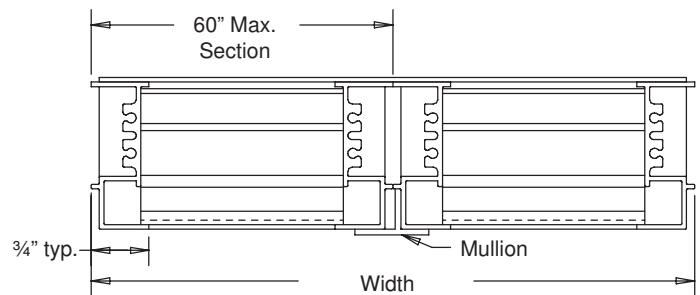
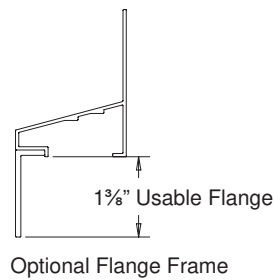
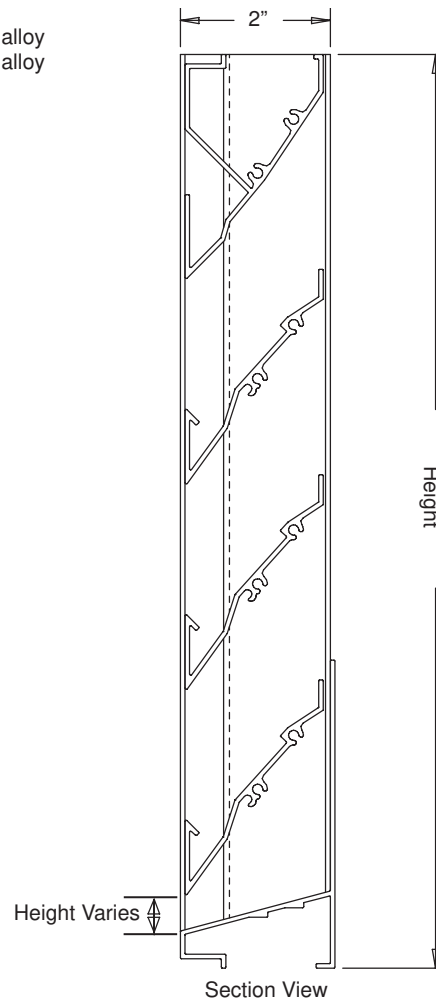
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame (Front Face Only)
 Welded Construction
 Blank-off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 3.8 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A258	12"W x 12"H	60"W x 96"H



air balance

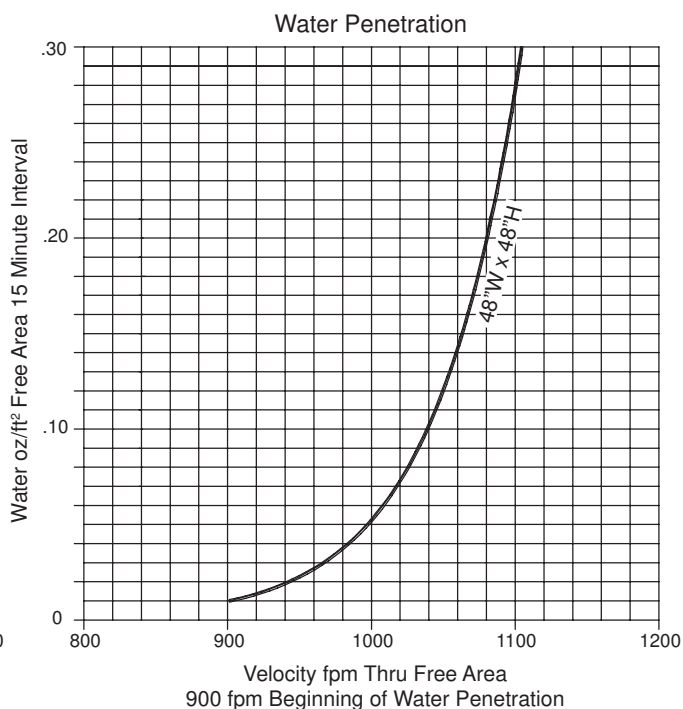
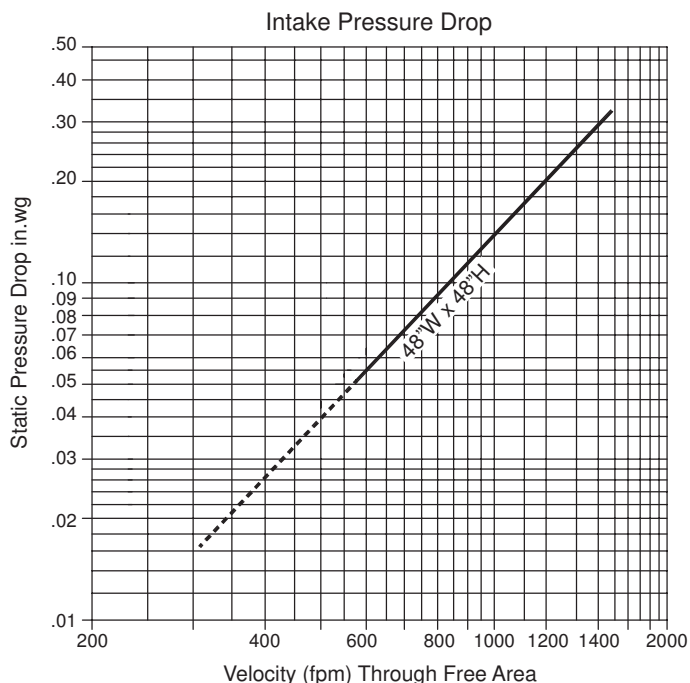
Dampers  Louvers
 UL Life Safety Products
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MODEL A258

2" Deep • 45° Drainable Blade • Extruded Aluminum Louver

Water Penetration: 800 fpm recommended maximum free area velocity
 Pressure Drop: 0.12 in.wg at 901 fpm and 6514 scfm
 Free Area: 7.23 sq.ft. = 45% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.



		Free Area sq.ft							
		Width							
Height	12"	0.28	0.44	0.60	0.76	0.92	1.08	1.24	1.40
	24"	0.78	1.23	1.69	2.14	2.59	3.04	3.49	4.39
	36"	1.19	1.87	2.55	3.23	3.91	4.60	5.28	6.64
	48"	1.63	2.56	3.50	4.43	5.37	6.30	7.23	9.11
	60"	2.05	3.23	4.41	5.59	6.77	7.95	9.14	10.32
	72"	2.45	3.86	5.27	6.68	8.09	9.50	10.91	12.32
	84"	2.94	4.63	6.32	8.01	9.70	11.39	13.08	14.77
	96"	3.36	5.29	7.22	9.15	11.08	13.00	14.93	16.86



ABI certifies that the Model A258 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Water Penetration Ratings.

air balance

Dampers  Louvers
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 Member of AMCA

MODEL A281

2" Deep • Inverted "Y" Horizontal Blade • Sightproof Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick; 6063-T6/T52 extruded aluminum alloy
BLADES: .064" thick; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" attened aluminum birdscreen
FINISH: Mill

OPTIONS

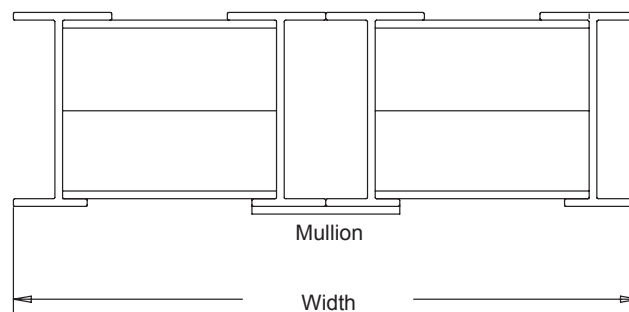
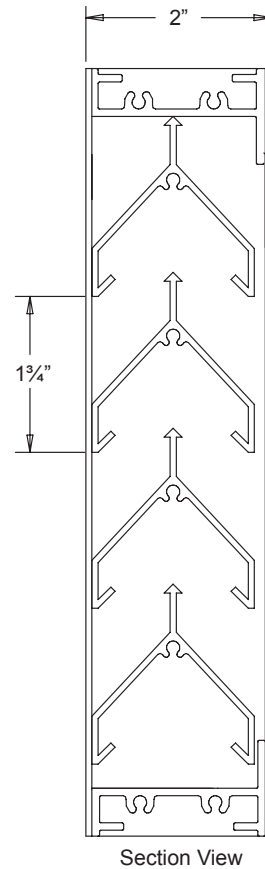
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 Welded Construction
 Blank-off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 3.8 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A281	12"W x 12"H	60"W x 96"H



MODEL A281

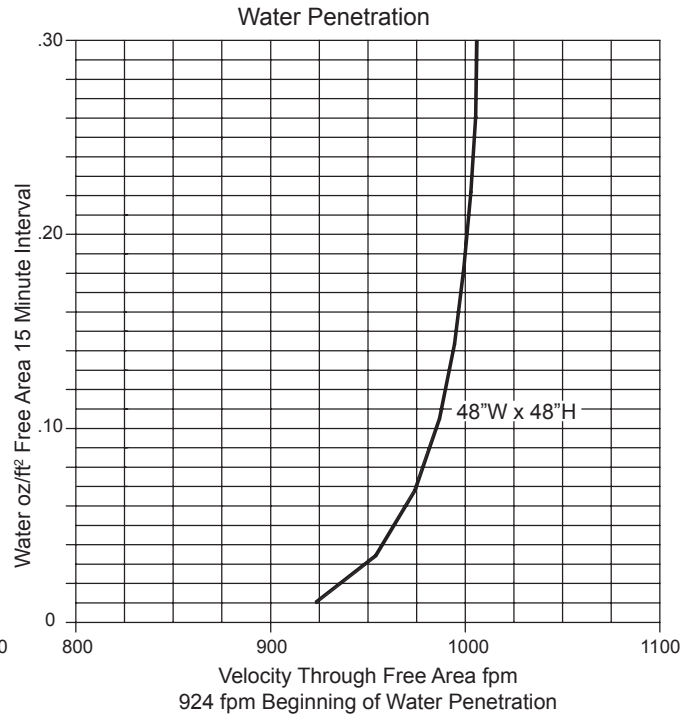
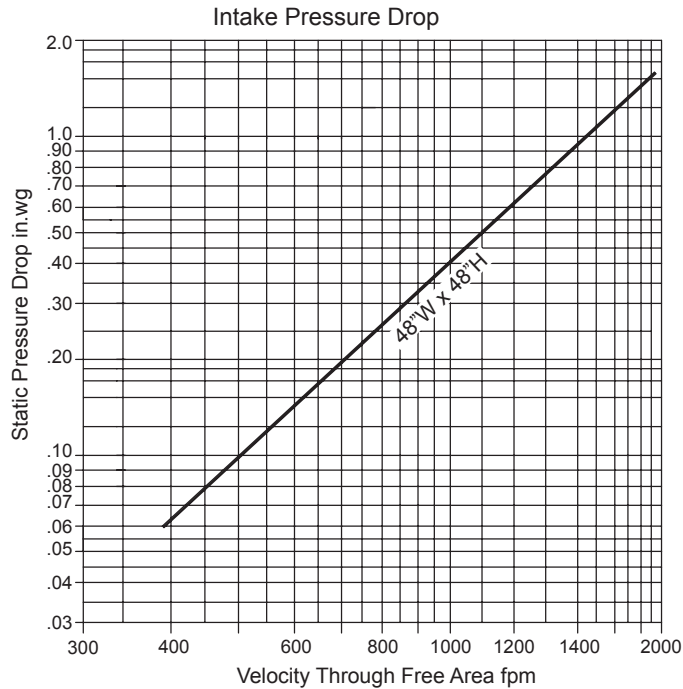
2" Deep • Inverted "Y" Horizontal Blade • Sightproof Extruded Aluminum Louver

Water Penetration: 850 fpm recommended maximum free area velocity

Pressure Drop: 0.40 in.wg at 1000 fpm and 4430 scfm

Free Area: 4.43 sq.ft. = 27.7% for 48"W x 48"H test size

Ratings do not include the effect of a birdscreen.



Free Area sq.ft.

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.26	0.42	0.57	0.73	0.88	1.04	1.20	1.35	1.51
	24"	0.50	0.80	1.10	1.40	1.70	2.00	2.30	2.60	2.90
	36"	0.74	1.18	1.63	2.07	2.52	2.96	3.70	3.85	4.29
	48"	0.98	1.57	2.16	2.74	3.33	3.92	4.43	5.10	5.68
	60"	1.22	1.95	2.68	3.42	4.15	4.88	5.61	6.34	7.08
	72"	1.46	2.34	3.21	4.09	4.96	5.84	6.72	7.59	8.47
	84"	1.70	2.72	3.74	4.76	5.78	6.80	7.82	8.84	9.86
	96"	2.02	3.24	4.45	5.67	6.88	8.10	9.31	10.53	11.74

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MODEL A424

4" Deep • 45° Dual Drainable Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
BLADES: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

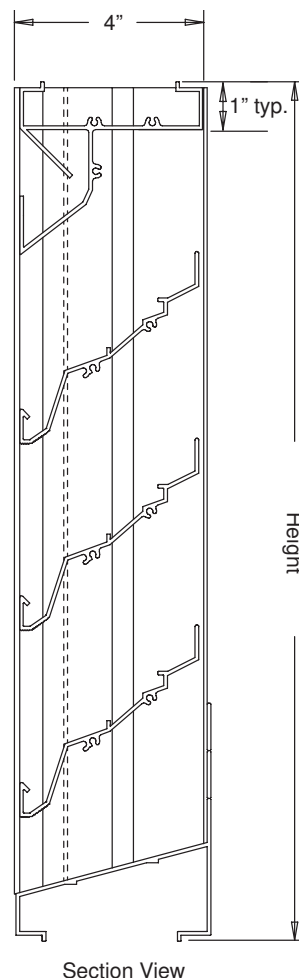
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame
 Welded Construction
 Blank-off Panels
 .125 Nominal Construction

NOTES

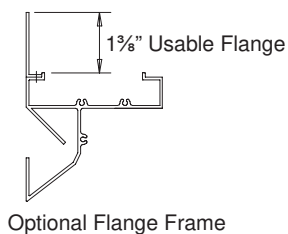
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 4 lbs./sq.ft.

LOUVER SIZES

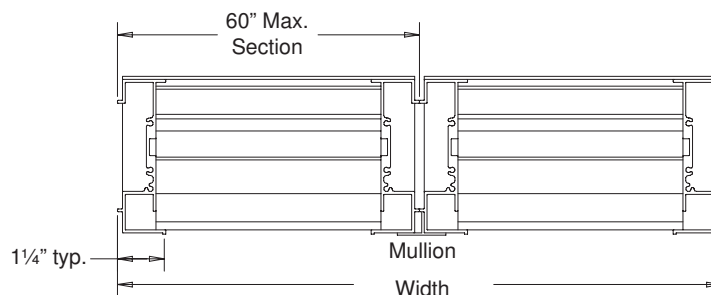
Panels	Min Panel	Max Single Panel
A424	12"W x 12"H	60"W x 96"H



Section View



Optional Flange Frame



air balance

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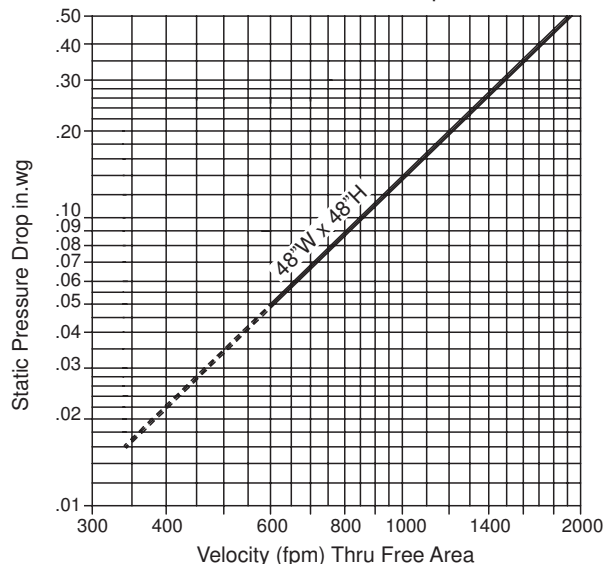
MODEL A424

4" Deep • 45° Dual Drainable Blade • Extruded Aluminum Louver

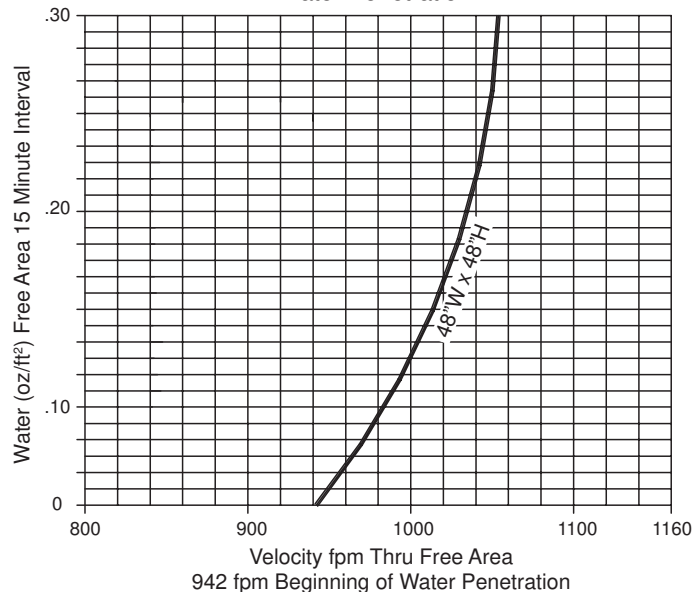
Water Penetration: At 1100 fpm recommended maximum free area velocity
 Pressure Drop: 0.15 in.wg at 1075 fpm and 8998 scfm
 Free Area: 8.37 sq.ft. = 52% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.

Intake Pressure Drop



Water Penetration



Free Area sq.ft

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.31	0.50	0.70	0.90	1.09	1.29	1.48	1.68	1.87
	24"	0.81	1.31	1.82	2.33	2.84	3.35	3.86	4.36	4.87
	36"	1.30	2.12	2.94	3.77	4.59	5.41	6.23	7.05	7.87
	48"	1.80	2.93	4.07	5.20	6.34	7.47	8.37	9.74	10.87
	60"	2.29	3.74	5.19	6.64	8.08	9.53	10.98	12.43	13.88
	72"	2.79	4.55	6.31	8.07	9.83	11.59	13.35	15.12	16.88
	84"	3.28	5.36	7.43	9.51	11.58	13.65	15.73	17.80	19.88
	96"	3.78	6.17	8.55	10.94	13.33	15.72	18.10	20.49	22.88



Air Balance Inc. certifies that the Model A424 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Water Penetration Ratings.

air balance

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MODEL A430

4" Deep • 37° Straight Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
BLADES: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

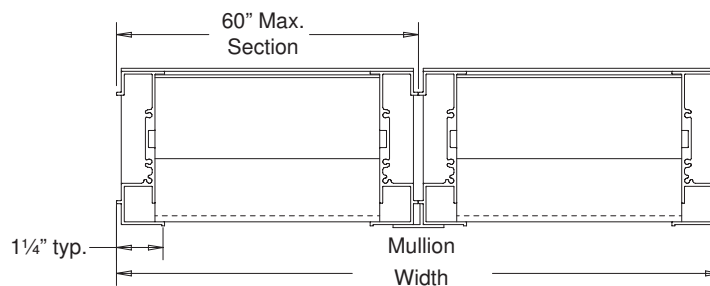
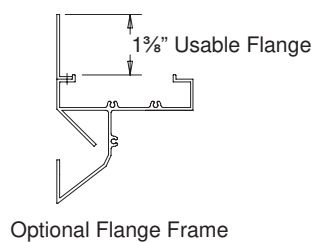
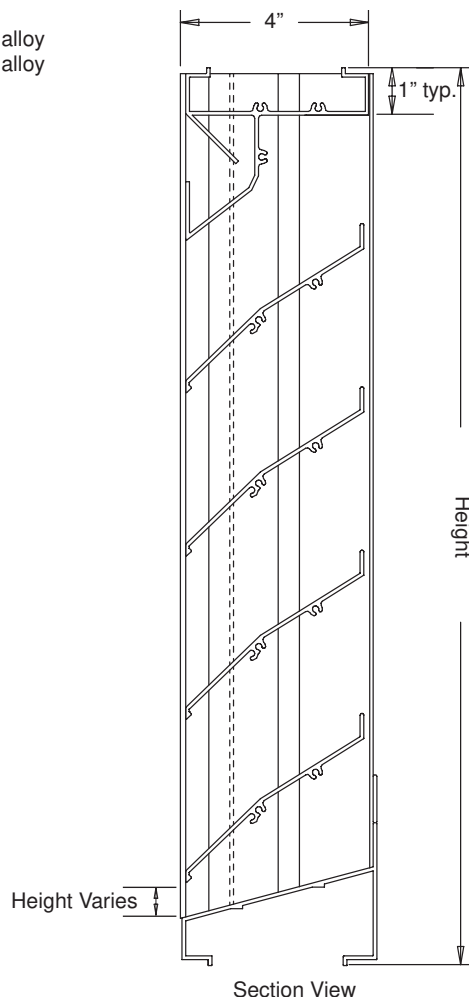
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame Welded Construction
 Blank-off Panels
 .125" Thick Nominal Construction
 Continuous Line Construction

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 5 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A430	12"W x 12"H	60"W x 96"H



air balance

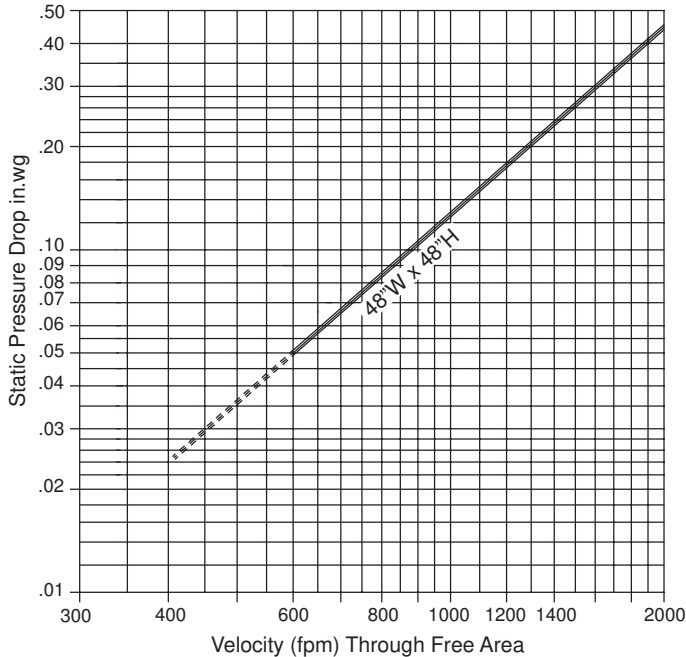
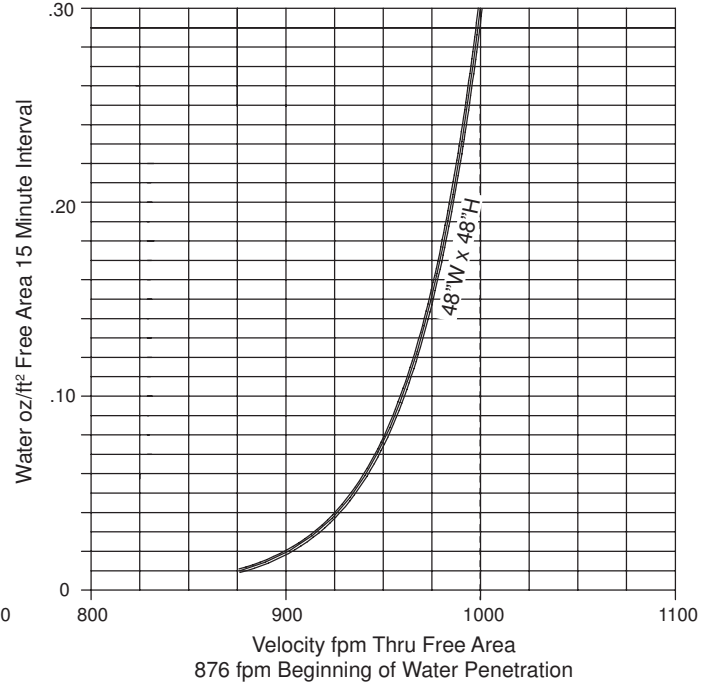
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MODEL A430

4" Deep • 37° Straight Blade • Extruded Aluminum Louver

Water Penetration: At 800 fpm recommended maximum free area velocity
 Pressure Drop: 0.10 in.wg at 876 fpm and 8024 scfm
 Free Area: 9.16 sq.ft. = 57% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.

Intake Pressure Drop**Water Penetration****Free Area sq.ft**

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.32	0.53	0.74	0.94	1.15	1.35	1.56	1.76	1.97
	24"	0.82	1.34	1.86	2.38	2.90	3.42	3.94	4.46	4.98
	36"	1.31	2.14	2.96	3.79	4.62	5.45	6.27	7.10	7.93
	48"	1.93	3.15	4.36	5.58	6.81	8.02	9.16	10.45	11.67
	60"	2.37	3.87	5.37	6.86	8.36	9.86	11.35	12.85	14.35
	72"	2.99	4.88	6.76	8.65	10.54	12.42	14.31	16.20	18.08
	84"	3.48	5.67	7.87	10.06	12.26	14.45	16.65	18.84	21.04
	96"	4.04	6.59	9.14	11.69	14.24	16.79	19.34	21.89	24.44



ABI certifies that the Model A430 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Water Penetration Ratings.

air balance

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MODEL A435

4" Deep • 37° Drainable Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
BLADES: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

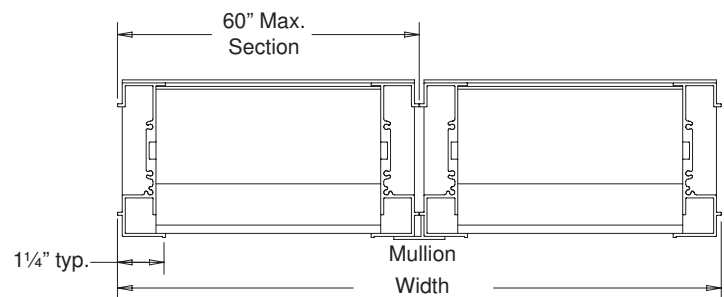
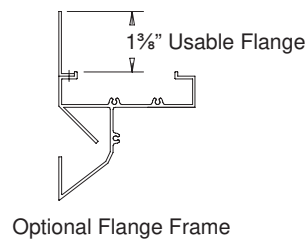
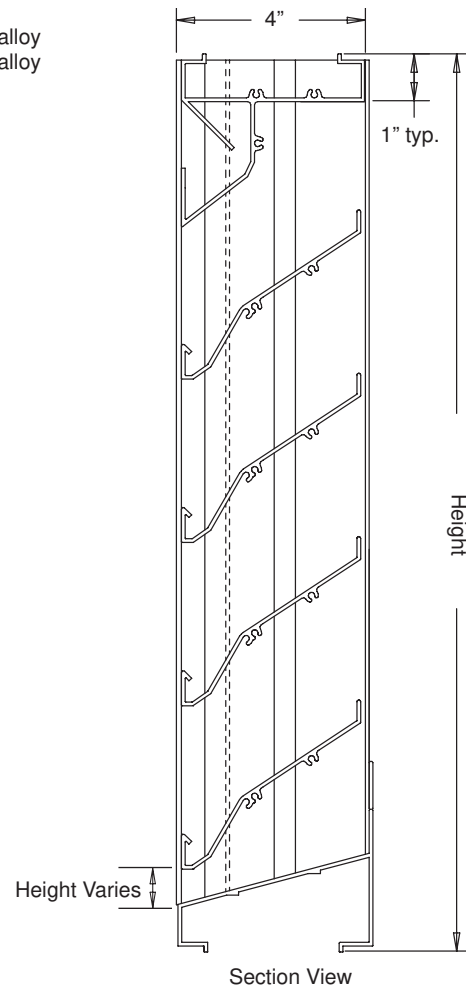
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame
 Welded Construction
 Blank-off Panels
 .125 Nominal Construction

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 5 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A435	12"W x 12"H	60"W x 96"H



air balance

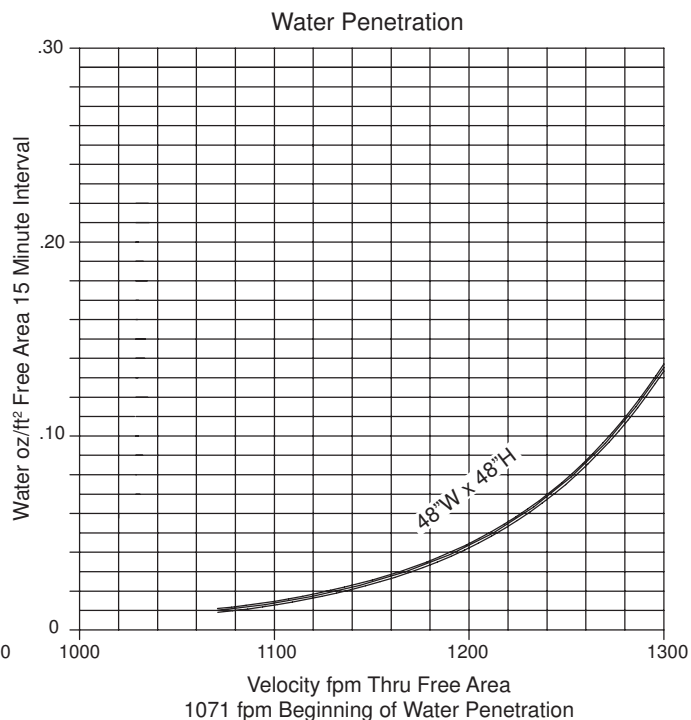
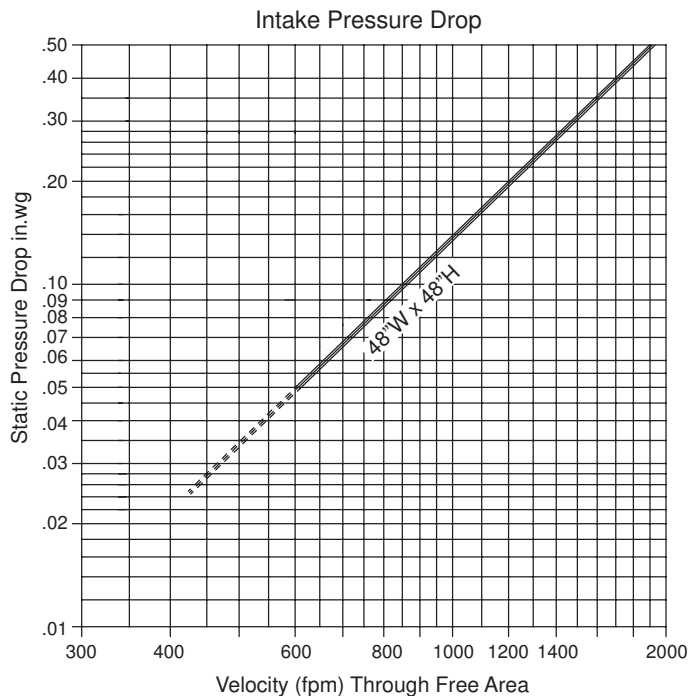
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MODEL A435

4" Deep • 37° Drainable Blade • Extruded Aluminum Louver

Water Penetration: At 1000 fpm recommended maximum free area velocity
 Pressure Drop: 0.16 in.wg at 1071 fpm and 9714 scfm
 Free Area: 9.07 sq.ft. = 57% for 48"W x 48"H test size

Results do not include the effects of birdscreen.



Free Area sq.ft

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.33	0.53	0.74	0.95	1.16	1.36	1.57	1.77	1.98
	24"	0.80	1.30	1.81	2.31	2.82	3.32	3.82	4.33	4.83
	36"	1.26	2.05	2.84	3.64	4.43	5.23	6.02	6.81	7.61
	48"	1.84	3.00	4.16	5.32	6.48	7.64	9.07	9.97	11.13
	60"	2.25	3.68	5.10	6.52	7.95	9.37	10.79	12.21	13.64
	72"	2.83	4.62	6.41	8.20	9.99	11.78	13.57	15.36	17.15
	84"	3.29	5.37	7.45	9.53	11.61	13.69	15.77	17.85	19.93
	96"	3.82	6.23	8.64	11.05	13.47	15.88	18.29	20.70	23.11



ABI certifies that the Model A435 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Water Penetration Ratings.

air balance

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MODEL A440

4" Deep • 30° Baffle Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick; 6063-T52/T6 extruded aluminum alloy
BLADES: .081" thick; 6063-T52/T6 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

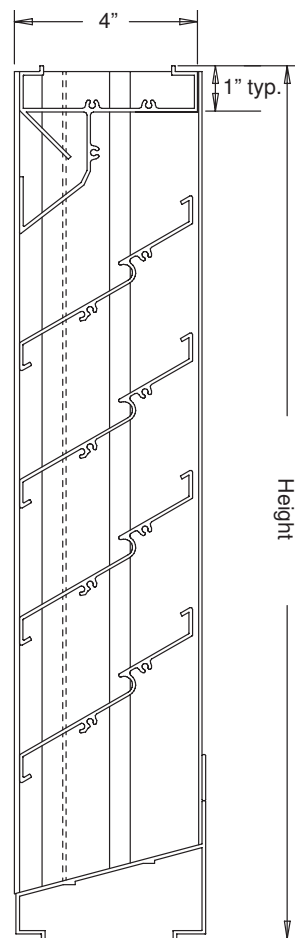
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame
 Welded Construction
 Blank-off Panels

NOTES

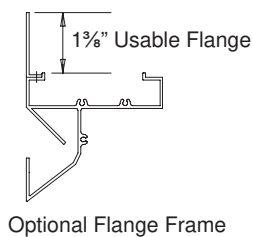
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 5.2 lbs./sq.ft.

LOUVER SIZES

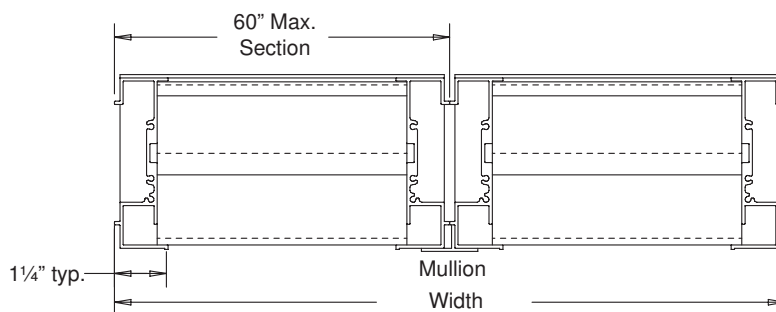
Panels	Min Panel	Max Single Panel
A440	12"W x 12"H	60"W x 96"H



Section View



Optional Flange Frame



air balance

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MODEL A440

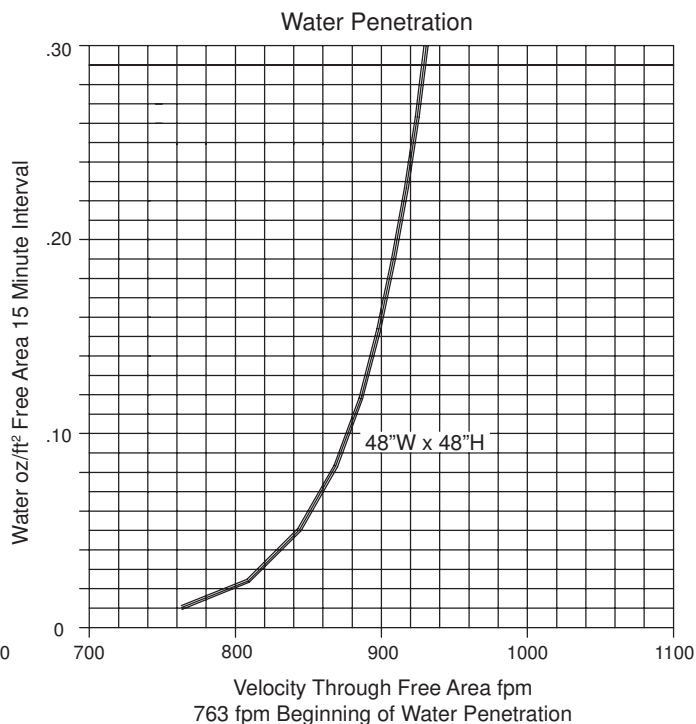
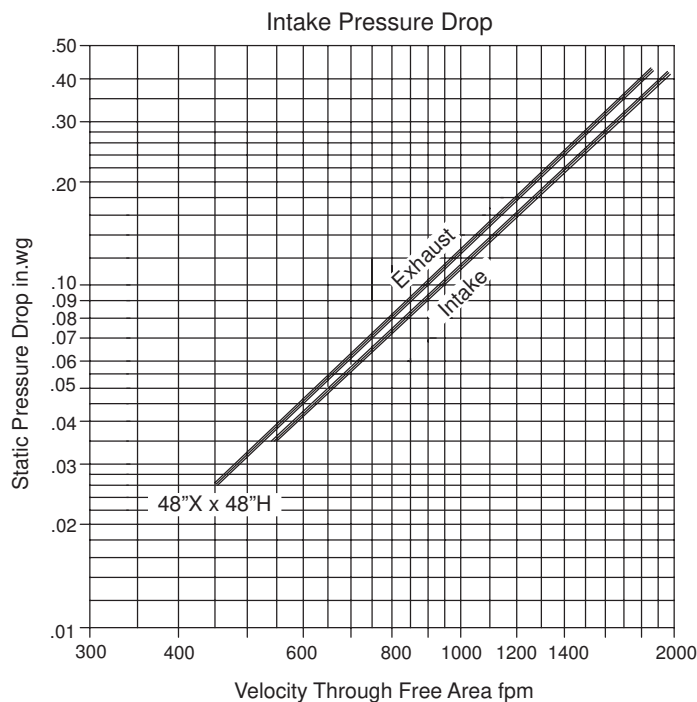
4" Deep • 30° Baffle Blade • Extruded Aluminum Louver

Water Penetration: 700 fpm recommended maximum free area velocity

Pressure Drop: 0.07 in.wg at 800 fpm and 6128 scfm

Free Area: 7.66 sq.ft. = 47.9% for 48"W x 48"H test size

Ratings do not include the effect of a birdscreen.



Free Area sq.ft.

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.32	0.51	0.71	0.91	1.10	1.30	1.50	1.70	1.89
	24"	0.74	1.21	1.68	2.15	2.62	3.08	3.55	4.02	4.49
	36"	1.17	1.91	2.65	3.39	4.13	4.87	5.61	6.35	7.08
	48"	1.60	2.61	3.62	4.63	5.64	6.65	7.66	8.67	9.68
	60"	2.03	3.31	4.59	5.87	7.15	8.43	9.71	10.99	12.28
	72"	2.46	4.01	5.56	7.11	8.66	10.22	11.77	13.32	14.87
	84"	2.89	4.71	6.53	8.35	10.18	12.00	13.82	15.64	17.47
	96"	3.32	5.41	7.50	9.60	11.69	13.78	15.88	17.97	20.06

air balance

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MODEL A445

4" Deep • 45° Drainable Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** .081" thick nominal; 6063-T6/T52 extruded aluminum alloy**BLADES:** .081" thick nominal; 6063-T6/T52 extruded aluminum alloy**ASSEMBLY:** Mechanically fastened**SCREEN:** 1/2" x .051" flattened aluminum birdscreen**FINISH:** Mill**OPTIONS**

Finish - Baked Enamel, Kynar, or Anodize

Variety of Bird and Insect Screen

1 3/8" Usable Flange Frame

Welded Construction

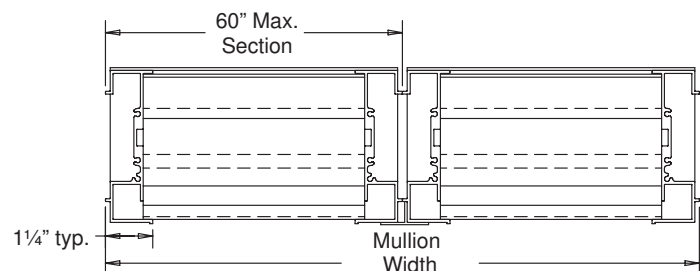
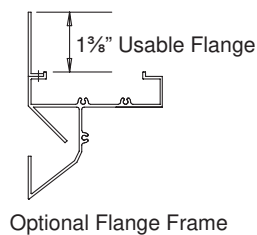
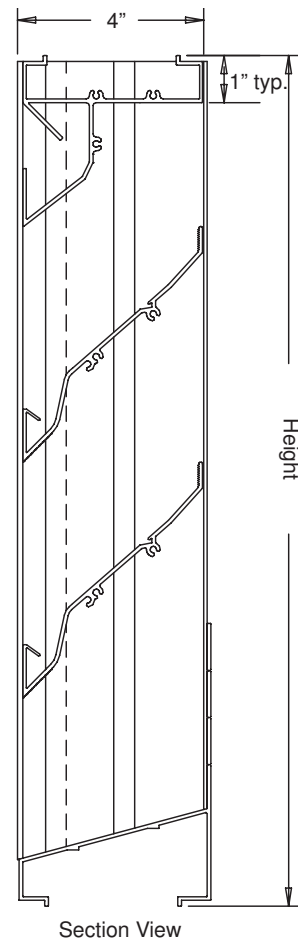
Blank-off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 4 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A445	12"W x 12"H	40 sq.ft.



air balance

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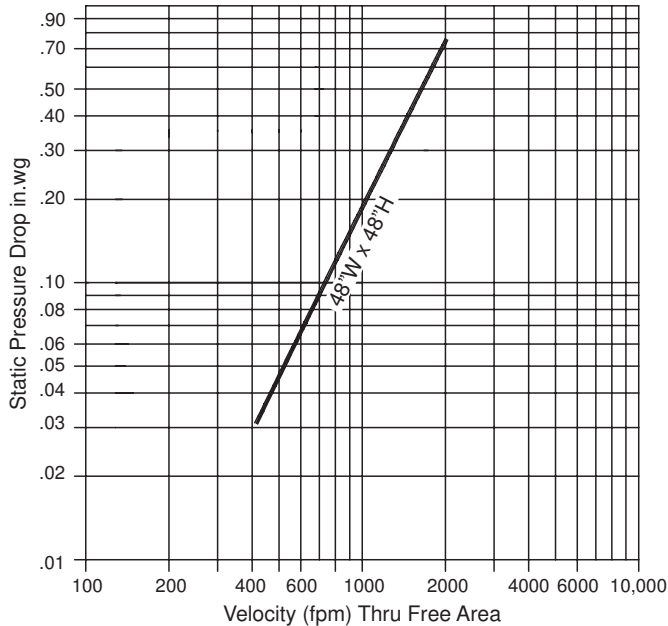
MODEL A445

4" Deep • 45° Drainable Blade • Extruded Aluminum Louver

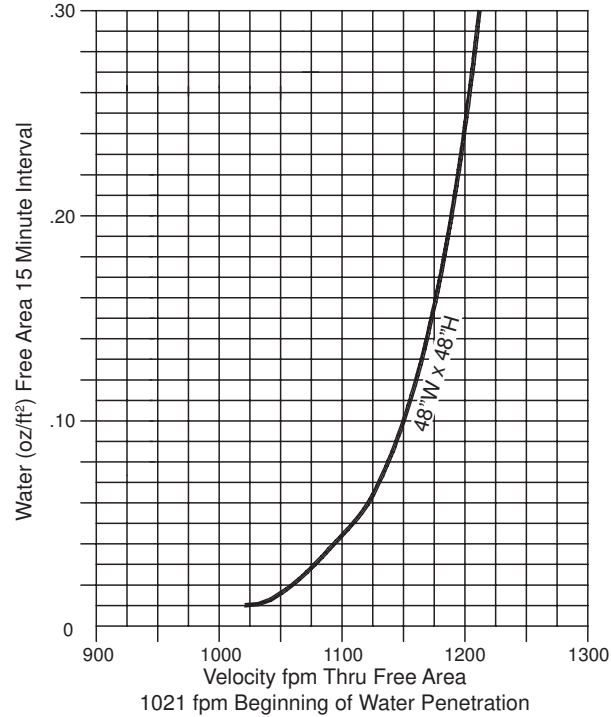
Water Penetration: At 1000 fpm recommended maximum free area velocity
 Pressure Drop: 0.21 in.wg at 1021 fpm and 8331 scfm
 Free Area: 8.16 sq.ft. = 51% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.

Intake Pressure Drop



Water Penetration



Free Area sq.ft

		Width									
		12"	24"	36"	48"	60"	72"	84"	96"	108"	120"
Height	12"	.25	.56	.87	1.19	1.50	1.75	2.06	2.37	2.68	3.00
	24"	.74	1.68	2.52	3.55	4.49	5.23	6.17	7.11	8.05	9.98
	36"	1.20	2.72	4.24	5.75	7.27	8.47	9.99	11.51	13.03	14.54
	48"	1.67	3.79	5.90	8.16	10.12	11.80	13.91	16.02	18.13	20.25
	60"	2.15	4.87	7.59	10.31	13.03	15.18	17.90	20.62	23.34	26.06
	72"	2.61	5.92	9.22	12.52	15.83	18.44	21.75	25.05	28.35	31.65
	84"	3.11	7.04	10.97	14.89	18.82	21.93	25.86	29.79	33.71	37.54
	96"	3.57	8.08	12.58	17.09	21.60	25.17	29.68	34.18	38.69	43.20
	108"	4.04	9.14	14.25	19.35	24.45	28.49	33.60	38.70	43.80	48.90
	120"	4.52	10.23	15.94	21.65	27.36	31.88	37.59	43.30	49.01	54.71



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MODEL A455

4" Deep • 45° Straight Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
BLADES: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

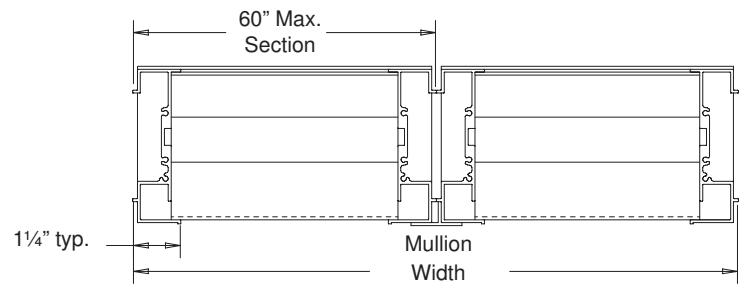
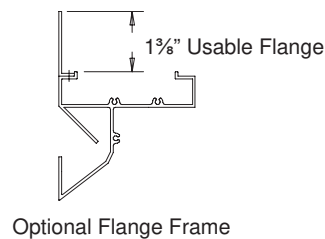
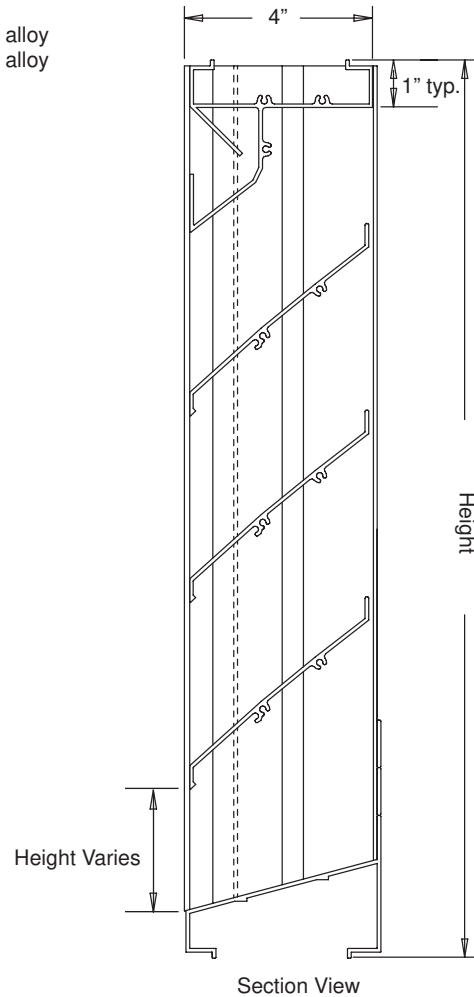
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame
 Welded Construction
 Blank-off Panels
 .125 Nominal Construction
 Continuous Line Construction

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 4 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A455	12"W x 12"H	60"W x 96"H



air balance

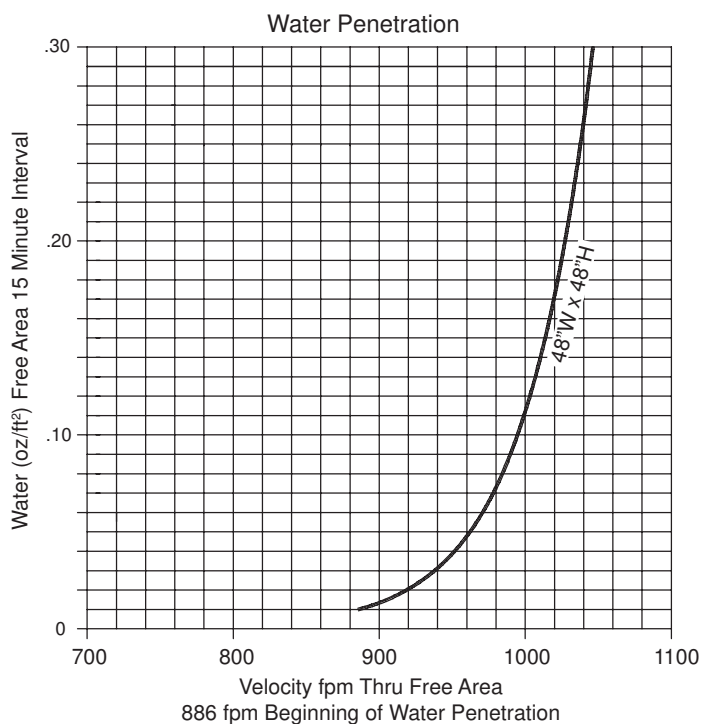
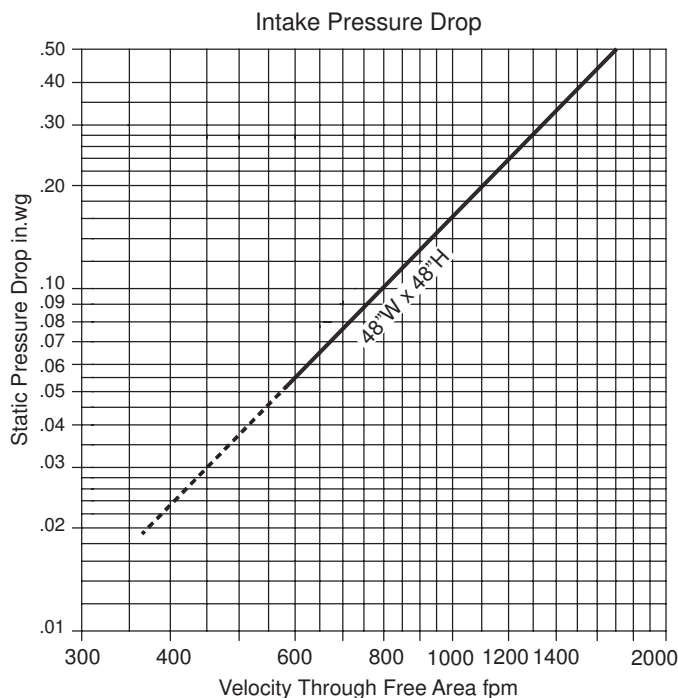
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MODEL A455

4" Deep • 45° Straight Blade • Extruded Aluminum Louver

Water Penetration: 800 fpm maximum free area velocity
 Pressure Drop: 0.125 in.wg at 886 fpm and 8054 scfm
 Free Area: 9.09 sq.ft. = 57% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen



Free Area sq.ft

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.31	0.50	0.70	0.89	1.09	1.28	1.48	1.67	1.87
	24"	0.82	1.34	1.86	2.38	2.90	3.42	3.94	4.46	4.98
	36"	1.34	2.18	3.03	3.87	4.71	5.56	6.40	7.25	8.09
	48"	1.85	3.02	4.19	5.36	6.53	7.70	9.09	10.04	11.20
	60"	2.37	3.86	5.35	6.85	8.34	9.84	11.33	12.82	14.32
	72"	2.88	4.70	6.52	8.34	10.16	11.97	13.79	15.61	17.43
	84"	3.39	5.54	7.68	9.83	11.97	14.11	16.26	18.40	20.54
	96"	3.91	6.38	8.85	11.31	13.78	16.25	18.72	21.19	23.66



ABI certifies that the Model A455 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Water Penetration Ratings.

air balance

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MODEL A465

4" Deep • 45° Baffle Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
BLADES: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

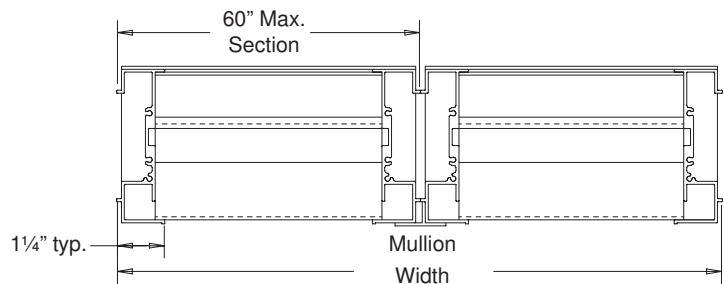
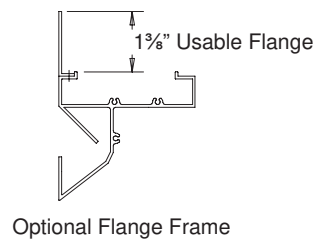
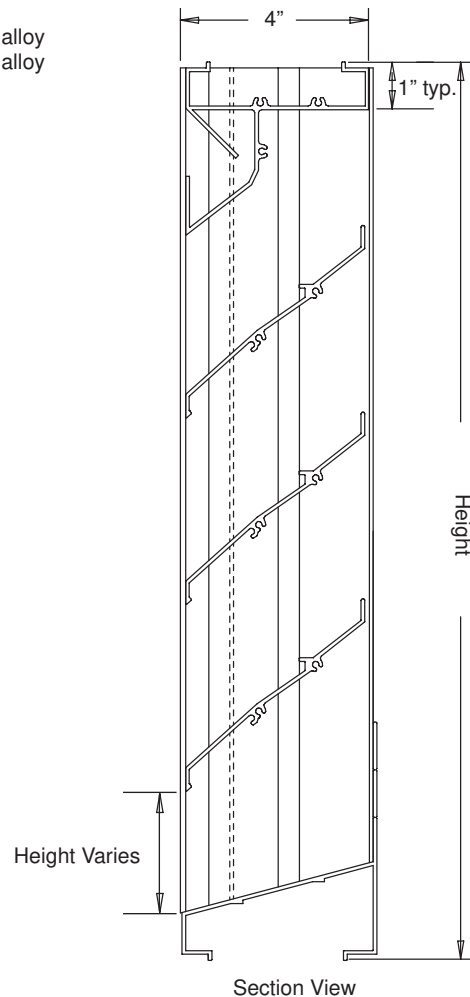
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame
 Welded Construction
 Blank-off Panels
 .125" Thick Nominal Construction

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 4 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A465	12"W x 12"H	60"W x 96"H



air balance

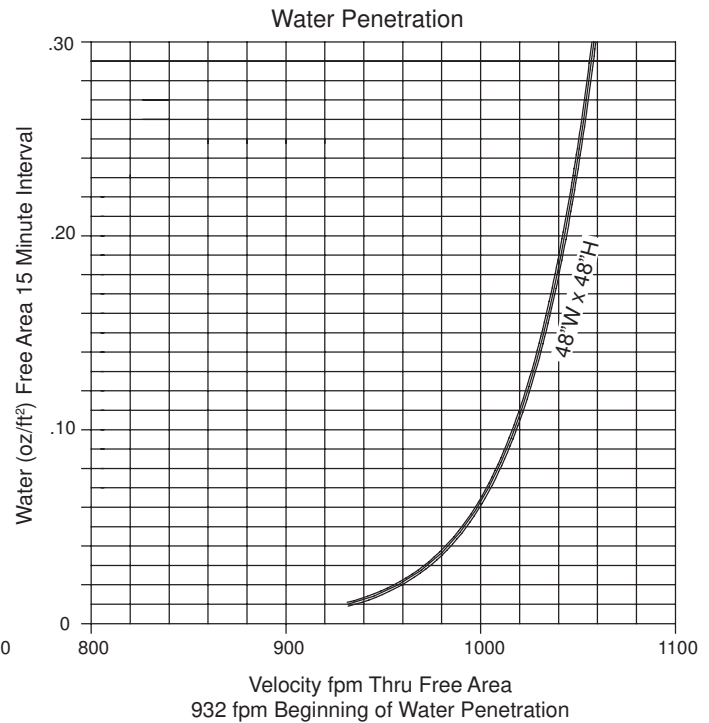
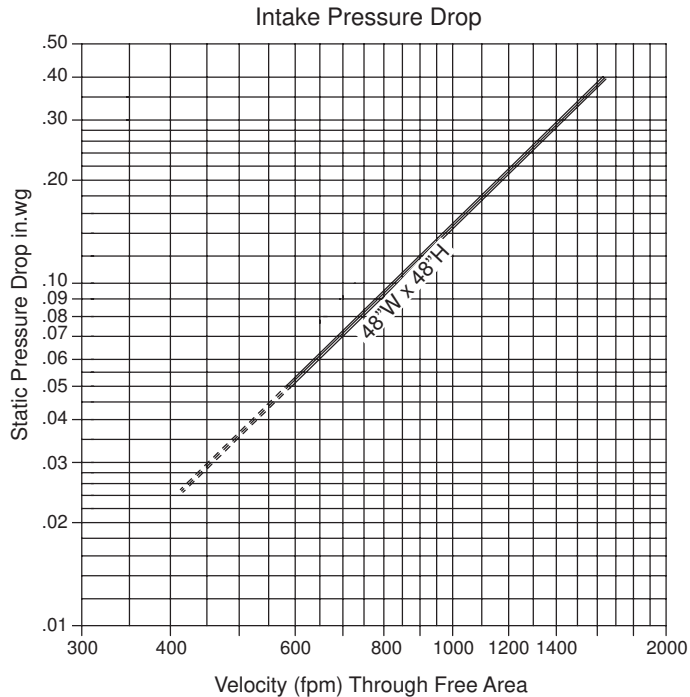
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MODEL A465

4" Deep • 45° Baffle Blade • Extruded Aluminum Louver

Water Penetration: 900 fpm recommended free area velocity
 Pressure Drop: 0.125 in.wg at 932 fpm and 8407 scfm
 Free Area: 9.02 sq.ft. = 56% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.



Free Area sq.ft

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.31	0.50	0.70	0.89	1.09	1.28	1.48	1.67	1.87
	24"	0.82	1.34	1.86	2.38	2.90	3.42	3.94	4.46	4.98
	36"	1.34	2.18	3.03	3.87	4.71	5.56	6.40	7.25	8.09
	48"	1.85	3.02	4.19	5.36	6.53	7.70	9.02	10.04	11.20
	60"	2.37	3.86	5.35	6.85	8.34	9.84	11.33	12.82	14.32
	72"	2.88	4.70	6.52	8.34	10.16	11.97	13.79	15.61	17.43
	84"	3.39	5.54	7.68	9.83	11.97	14.11	16.26	18.40	20.54
	96"	3.91	6.38	8.85	11.31	13.78	16.25	18.72	21.19	23.66



ABI certifies that the Model A465 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Water Penetration Ratings.

air balance

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MODEL A481

4" Deep • Inverted "Y" Blade • Sightproof Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick; 6063-T6/T52 extruded aluminum alloy
BLADES: .081" thick; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

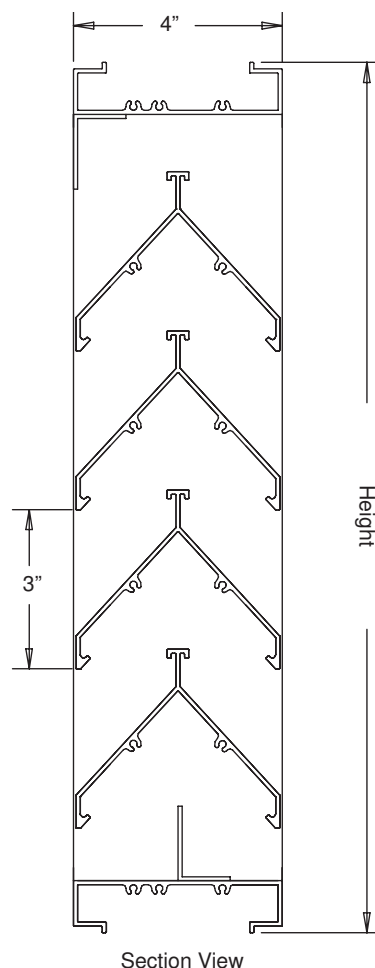
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame
 Welded Construction
 Blank-off Panels

NOTES

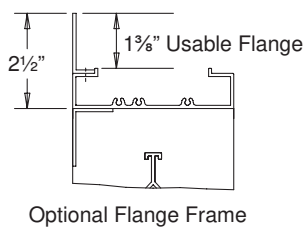
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 3.8 lbs./sq.ft.

LOUVER SIZES

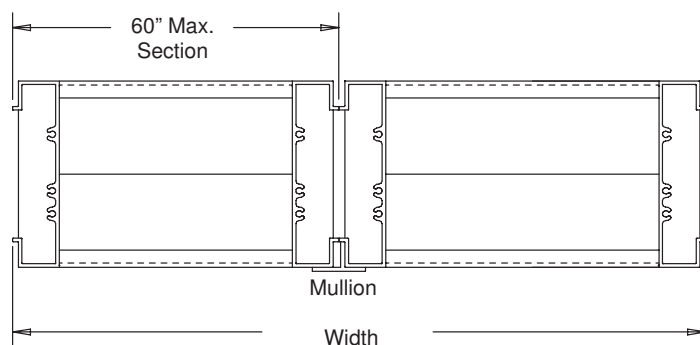
Panels	Min Panel	Max Single Panel
A481	12"W x 12"H	60"W x 96"H



Section View



Optional Flange Frame



air balance

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MODEL A481

4" Deep • Inverted "Y" Blade • Sightproof Extruded Aluminum Louver

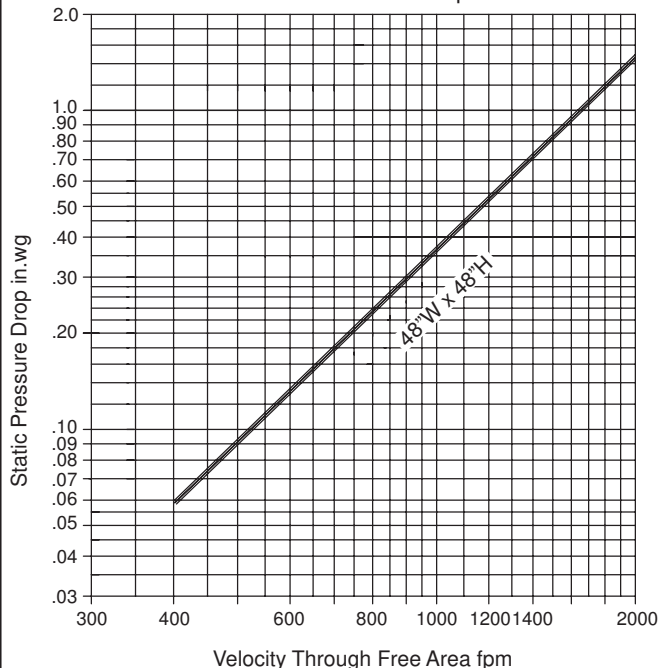
Water Penetration: 875 fpm recommended maximum free area velocity

Pressure Drop: 0.36 in.wg at 1000 fpm and 5980 scfm

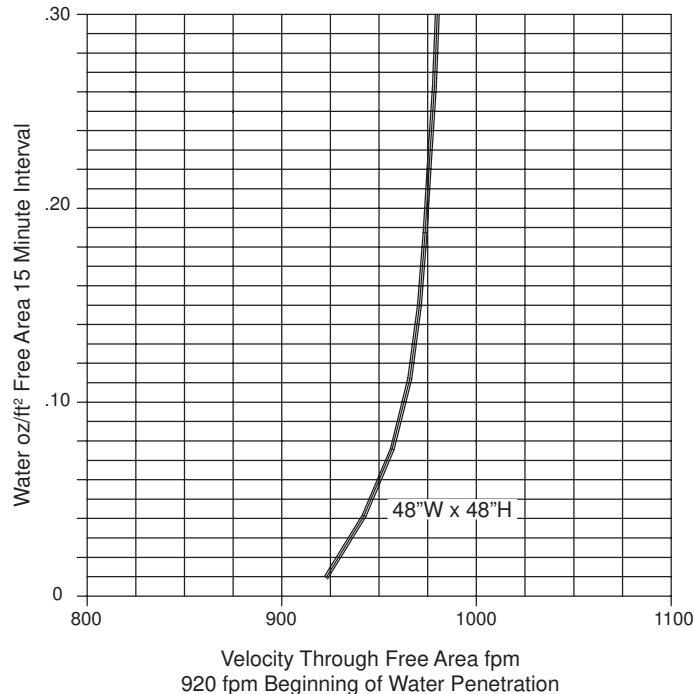
Free Area: 5.98 sq.ft. = 37.3% for 48"W x 48"H test size

Ratings do not include the effect of a birdscreen.

Intake Pressure Drop



Water Penetration



Free Area sq.ft.

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.26	0.39	0.52	0.65	0.77	0.90	1.03	1.16	1.29
	24"	0.67	1.01	1.34	1.68	2.01	2.35	2.68	3.02	3.35
	36"	1.08	1.62	2.17	2.71	3.25	3.79	4.33	4.87	5.41
	48"	1.50	2.24	2.99	3.74	4.49	5.23	5.98	6.73	7.48
	60"	1.91	2.86	3.81	4.77	5.72	6.68	7.63	8.58	9.54
	72"	2.32	3.48	4.64	5.80	6.96	8.12	9.28	10.44	11.60
	84"	2.73	4.10	5.46	6.83	8.20	9.56	10.93	12.29	13.66
	96"	3.14	4.72	6.29	7.86	9.43	11.00	12.58	14.15	15.72

air balance

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MODEL A482

4" Deep • Inverted "Y" Vertical Blade • Sightproof Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick; 6063-T6/T52 extruded aluminum alloy
BLADES: .081" thick; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

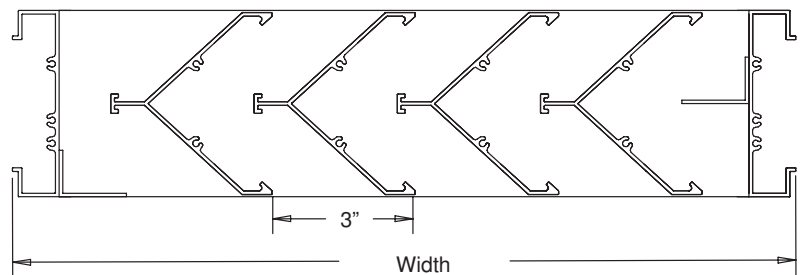
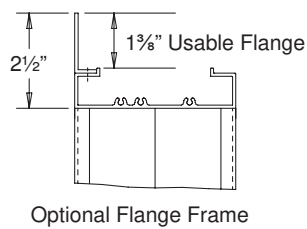
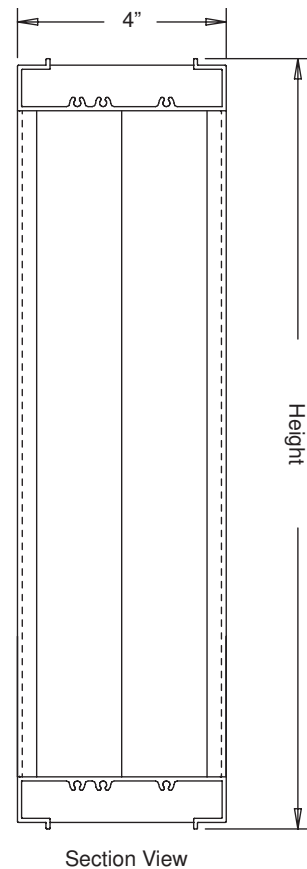
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame
 Welded Construction
 Blank-off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 3.8 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A482	12"W x 12"H	96"W x 60"H



air balance

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MODEL A482

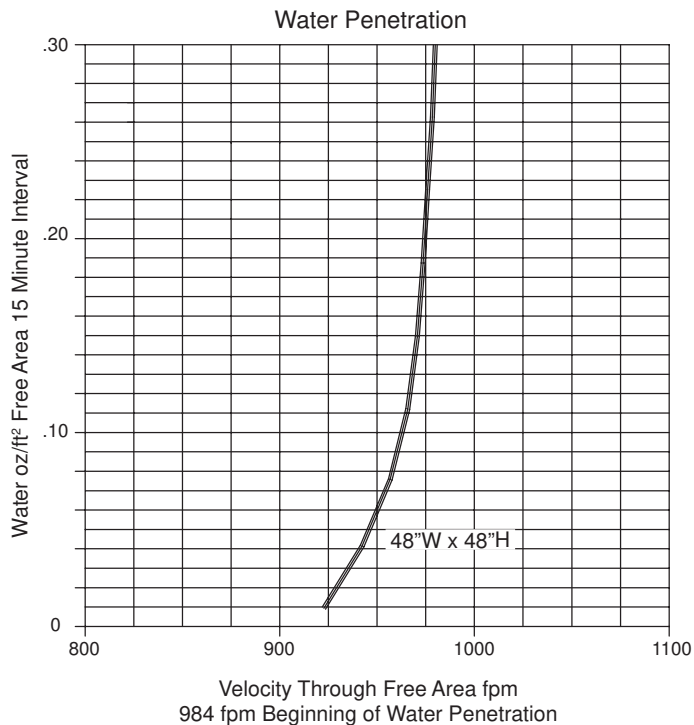
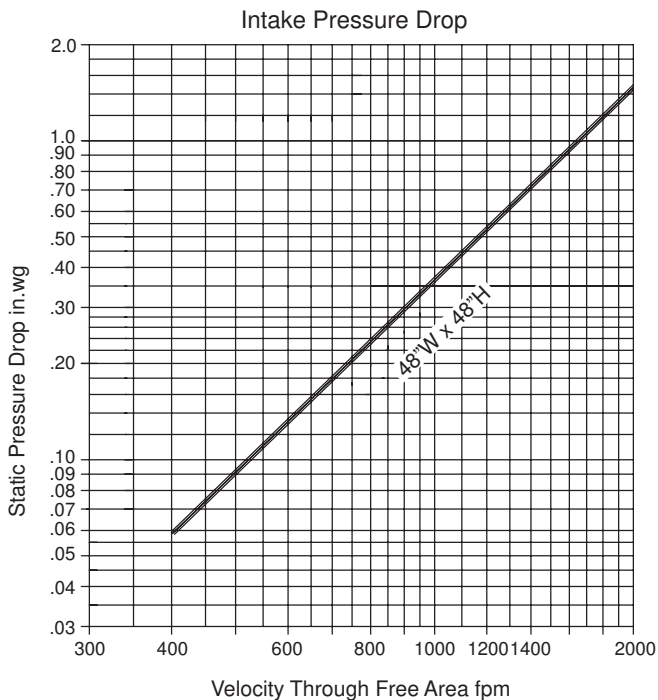
4" Deep • Inverted "Y" Vertical Blade • Sightproof Extruded Aluminum Louver

Water Penetration: 900 fpm recommended maximum free area velocity

Pressure Drop: 0.36 in.wg at 1000 fpm and 5980 scfm

Free Area: 5.98 sq.ft. = 37.3% for 48"W x 48"H test size

Ratings do not include the effect of a birdscreen.



Free Area sq.ft.										
		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.26	0.39	0.52	0.65	0.77	0.90	1.03	1.16	1.29
	24"	0.67	1.01	1.34	1.68	2.01	2.35	2.68	3.02	3.35
	36"	1.08	1.62	2.17	2.71	3.25	3.79	4.33	4.87	5.41
	48"	1.50	2.24	2.99	3.74	4.49	5.23	5.98	6.73	7.48
	60"	1.91	2.86	3.81	4.77	5.72	6.68	7.63	8.58	9.54
	72"	2.32	3.48	4.64	5.80	6.96	8.12	9.28	10.44	11.60
	84"	2.73	4.10	5.46	6.83	8.20	9.56	10.93	12.29	13.66
	96"	3.14	4.72	6.29	7.86	9.43	11.00	12.58	14.15	15.72

air balance

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MODEL A485

4" Deep • Chevron Blade • Sightproof Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** .081" thick; 6063-T6/T52 extruded aluminum alloy**BLADES:** .081" thick; 6063-T6/T52 extruded aluminum alloy**BLADE SPACING:** 3"**ASSEMBLY:** Mechanically fastened**SCREEN:** 1/2" x .051" flattened aluminum birdscreen**FINISH:** Mill**OPTIONS**

Finish - Baked Enamel, Kynar, or Anodize

Variety of Bird and Insect Screen

1 5/8" Usable Flange Frame (Front Face Only)

Welded Construction

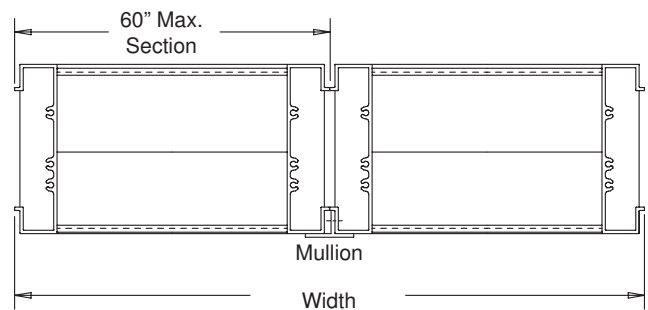
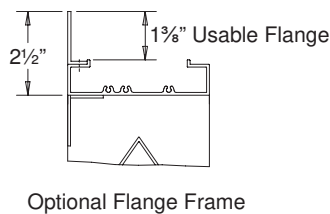
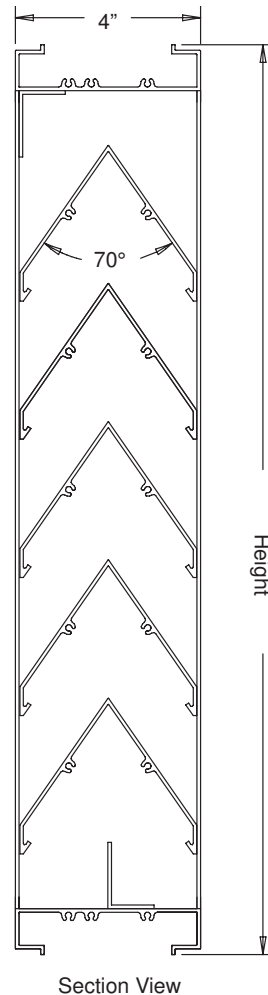
Blank-off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided 1/4" undercut.
2. Shipping weight approximately 5 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A485	12"W x 12"H	96"W x 60"H



air balance

Dampers  Louvers
UL Life Safety Products
Division of Mestek
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MODEL A485

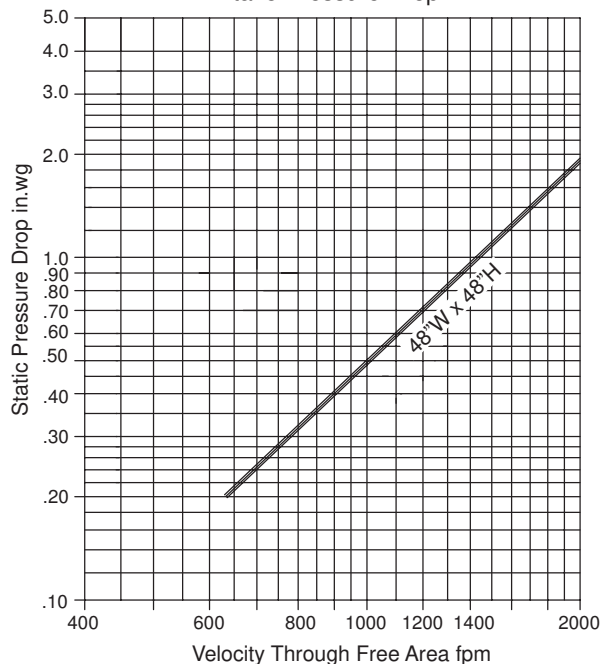
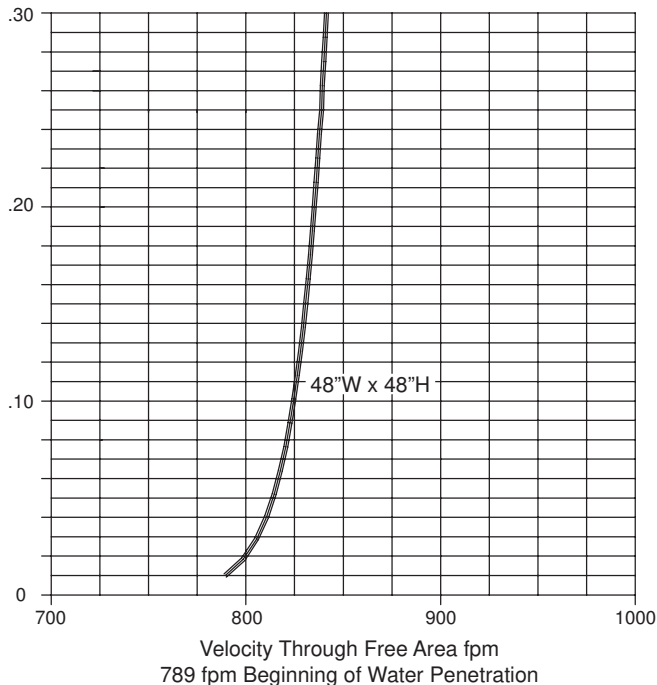
4" Deep • Chevron Blade • Sightproof Extruded Aluminum Louver

Water Penetration: At 750 fpm recommended maximum free area velocity

Pressure Drop: 0.50 in.wg at 1000 fpm and 6220 scfm

Free Area: 6.22 sq.ft. = 38.9% for 48"W x 48"H test size

Ratings do not include the effect of a birdscreen.

Intake Pressure Drop**Water Penetration****Free Area sq.ft.**

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.27	0.40	0.53	0.67	0.80	0.93	1.07	1.20	1.33
	24"	0.70	1.04	1.39	1.74	2.09	2.43	2.78	3.13	3.48
	36"	1.13	1.69	2.25	2.81	3.38	3.94	4.50	5.06	5.63
	48"	1.55	2.33	3.11	3.89	4.66	5.44	6.22	6.99	7.77
	60"	1.98	2.98	3.97	4.96	5.95	6.94	7.93	8.93	9.92
	72"	2.41	3.62	4.83	6.03	7.24	8.45	9.65	10.86	12.07
	84"	2.84	4.26	5.68	7.11	8.53	9.95	11.37	12.79	14.21
	96"	3.27	4.91	6.54	8.18	9.82	11.45	13.09	14.72	16.36

Dampers  Louvers
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MODEL A486

4" Deep • Chevron Vertical Blade • Sightproof Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick; 6063-T6/T52 extruded aluminum alloy
BLADES: .081" thick; 6063-T6/T52 extruded aluminum alloy
BLADE SPACING: 3"
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

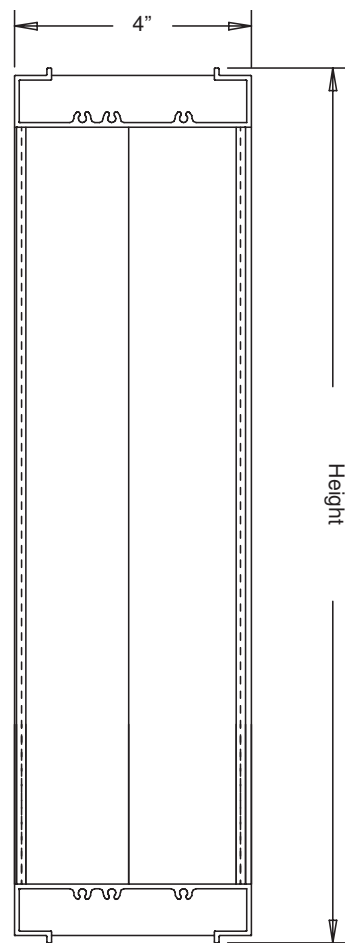
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 5/8" Usable Flange Frame
 Welded Construction
 Blank-off Panels

NOTES

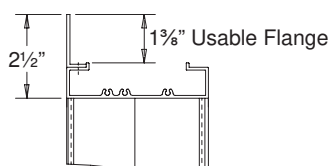
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 5 lbs./sq.ft.

LOUVER SIZES

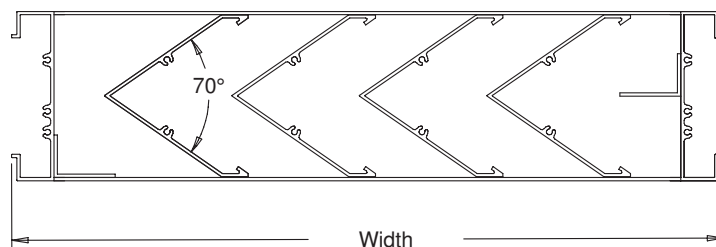
Panels	Min Panel	Max Single Panel
A486	12"W x 12"H	60"W x 96"H



Section View



Optional Flange Frame



air balance

Dampers  Louvers
 UL Life Safety Products
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MODEL A486

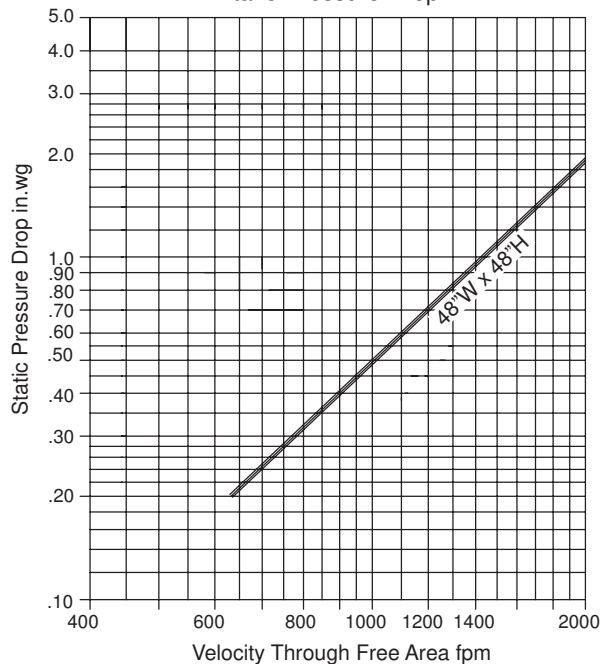
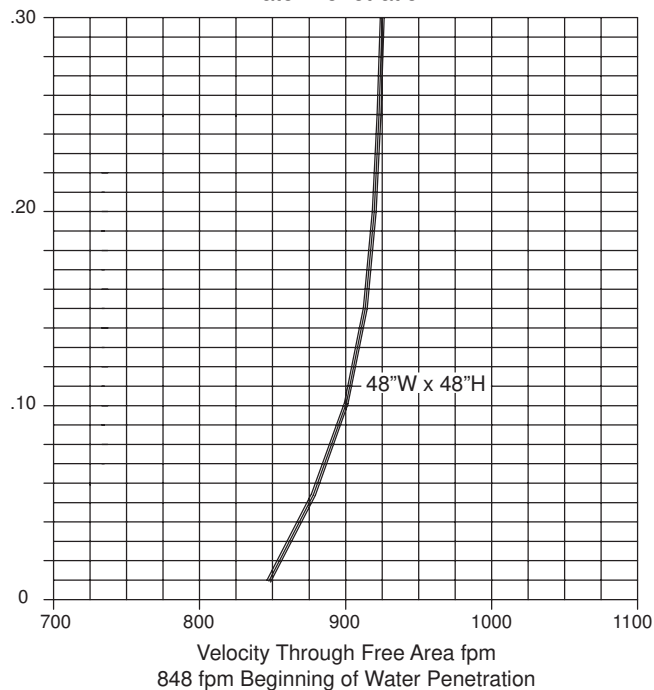
4" Deep • Chevron Vertical Blade • Sightproof Extruded Aluminum Louver

Water Penetration: At 800 fpm recommended maximum free area velocity

Pressure Drop: 0.50 in.wg at 1000 fpm and 6220 scfm

Free Area: 6.22 sq.ft. = 38.9% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.

Intake Pressure Drop**Water Penetration****Free Area sq.ft**

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.27	0.40	0.53	0.67	0.80	0.93	1.07	1.20	1.33
	24"	0.70	1.04	1.39	1.74	2.09	2.43	2.78	3.13	3.48
	36"	1.13	1.69	2.25	2.81	3.38	3.94	4.50	5.06	5.63
	48"	1.55	2.33	3.11	3.89	4.66	5.44	6.22	6.99	7.77
	60"	1.98	2.98	3.97	4.96	5.95	6.94	7.93	8.93	9.92
	72"	2.41	3.62	4.83	6.03	7.24	8.45	9.65	10.86	12.07
	84"	2.84	4.26	5.68	7.11	8.53	9.95	11.37	12.79	14.21
	96"	3.27	4.91	6.54	8.18	9.82	11.45	13.09	14.72	16.36

air balance

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MODEL A500

5" Deep • Chevron Drainable Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick nominal 6063-T6/T52 extruded aluminum alloy
BLADES: .060" thick; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

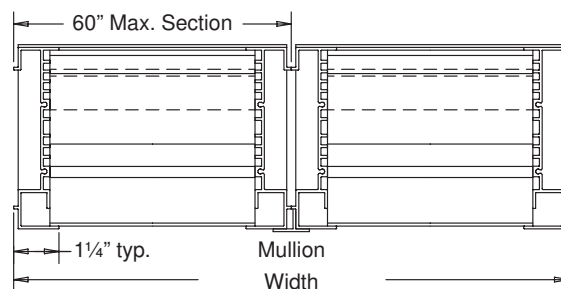
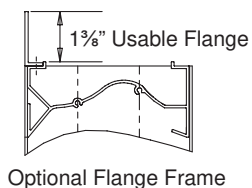
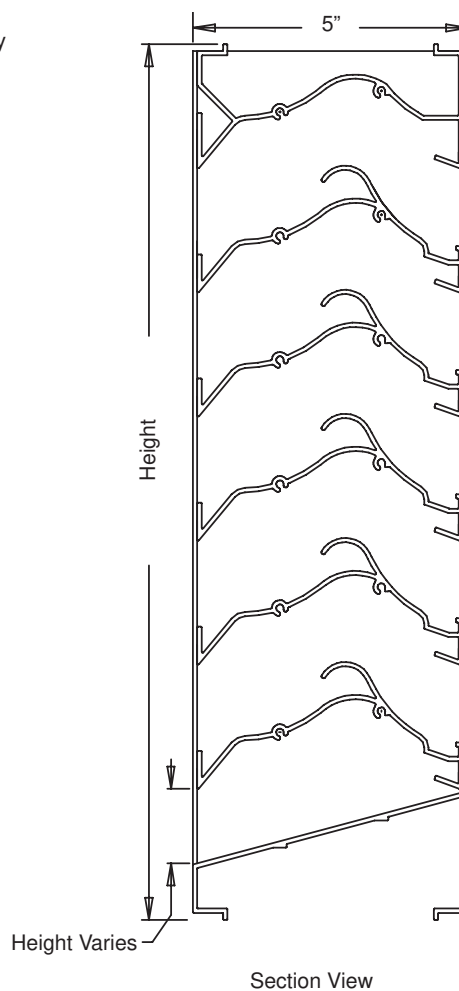
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame
 Welded Construction
 Blank-off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 5.5 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A500	12"W x 12"H	40 sq.ft.



air balance

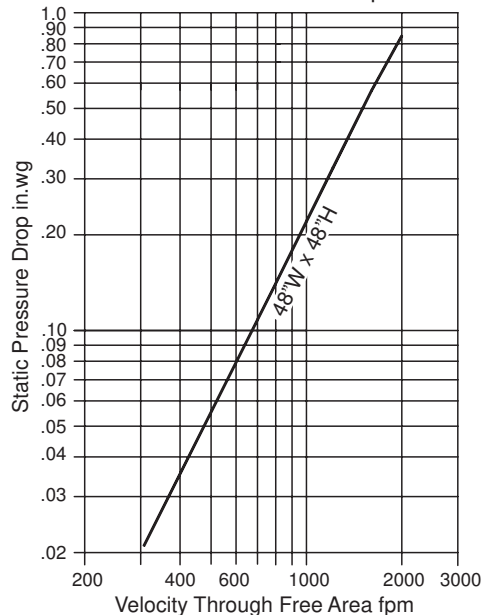
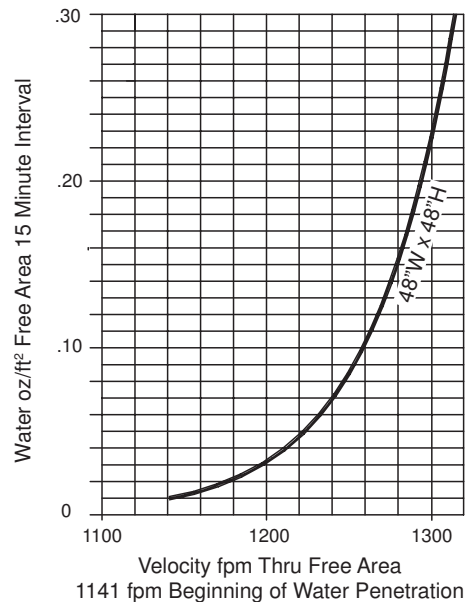
Dampers  Louvers
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MODEL A500

5" Deep • Chevron Drainable Blade • Extruded Aluminum Louver

Water Penetration: 0.208 in.wg at 1100 fpm maximum free area velocity
 Pressure Drop: 0.3 in.wg at 1141 fpm and 8820 scfm
 Free Area: 7.73 sq.ft. = 48.3% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.

Intake Pressure Drop**Water Penetration****Free Area sq.ft**

		Width									
		12"	24"	36"	48"	60"	72"	84"	96"	108"	120"
Height	12"	0.26	0.59	0.92	1.25	1.58	1.90	2.23	2.56	2.89	3.22
	24"	0.68	1.55	2.41	3.27	4.14	5.00	5.86	6.73	7.59	8.46
	36"	1.11	2.50	3.90	5.30	6.70	8.10	9.50	10.89	12.29	13.69
	48"	1.61	3.65	5.69	7.73	9.77	11.81	13.85	15.89	17.93	19.97
	60"	2.04	4.61	7.19	9.76	12.33	14.91	17.48	20.06	22.63	25.21
	72"	2.46	5.57	8.68	11.79	14.90	18.00	21.11	24.22	27.33	30.44
	84"	2.97	6.72	10.47	14.22	17.97	21.72	25.47	29.22	32.97	36.72
	96"	3.39	7.68	11.96	16.25	20.53	24.82	29.10	33.39	37.67	41.96
	108"	3.82	8.63	13.45	18.27	23.09	27.91	32.73	37.55	42.37	47.19
	120"	4.32	9.78	15.25	20.71	26.17	31.63	37.09	42.55	48.01	53.47



ABI certifies that the Model A500 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Water Penetration Ratings.

air balance

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MODEL A634

6" Deep • 35°/42° Drainable Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .125" thick nominal; 6063-T6/T52 extruded aluminum alloy
BLADES: .125" thick nominal; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

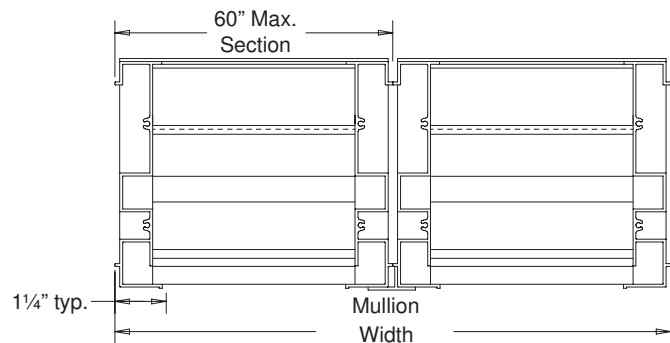
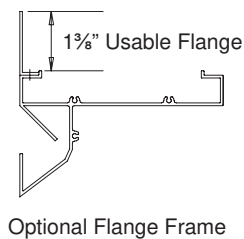
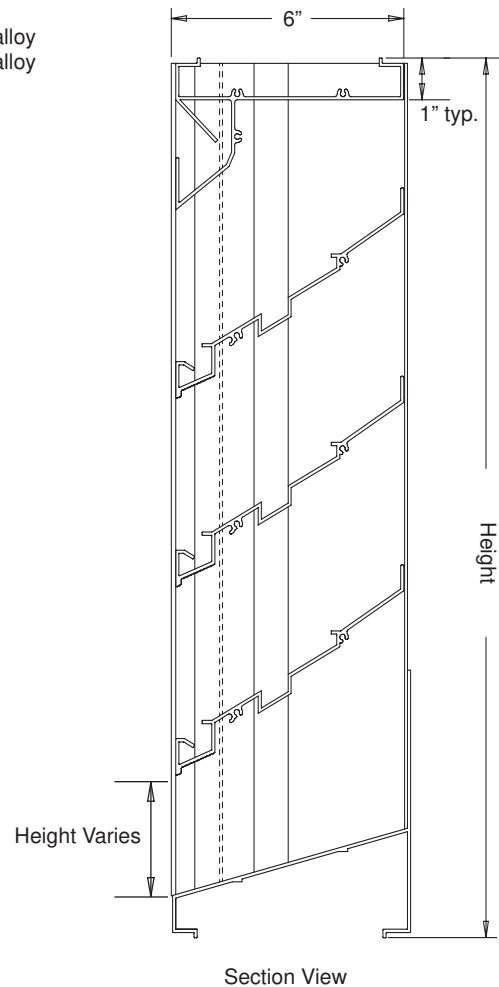
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame
 Welded Construction
 Blank-off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 4 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A634	12"W x 12"H	60"W x 96"H



air balance

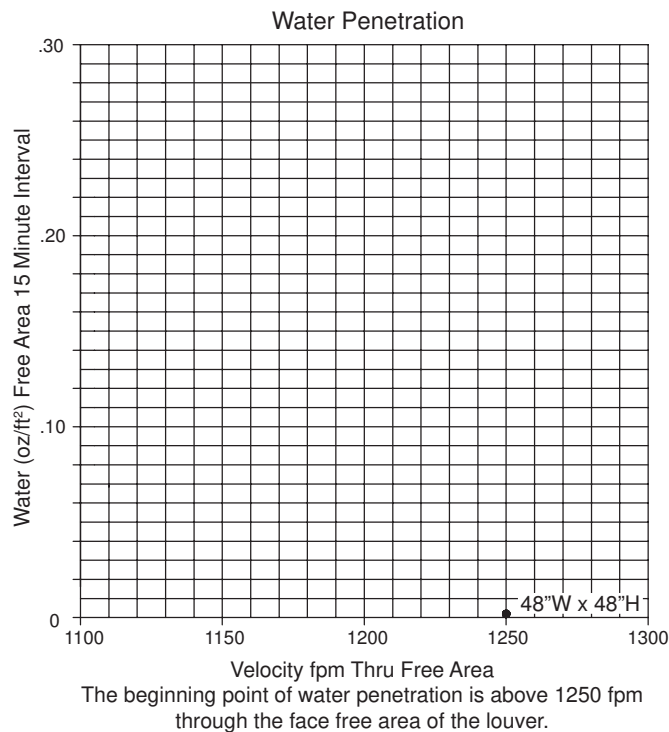
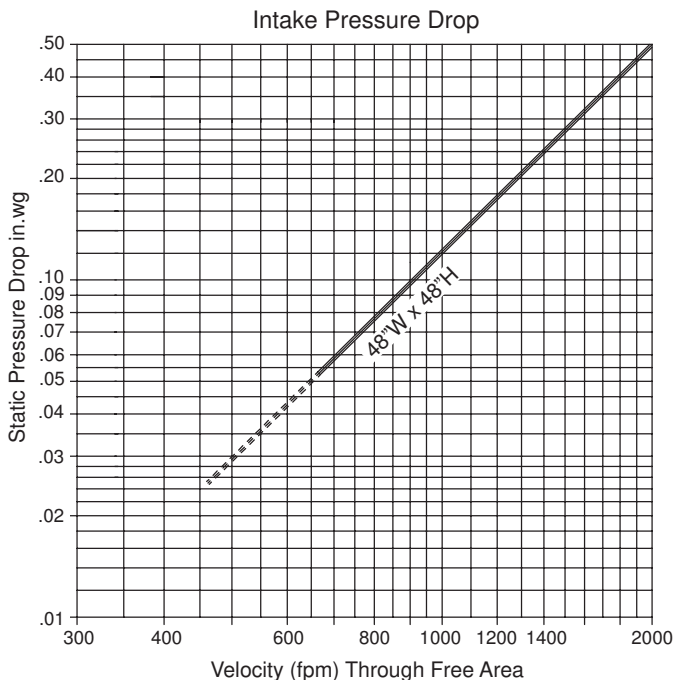
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MODEL A634

6" Deep • 35°/42° Drainable Blade • Extruded Aluminum Louver

Water Penetration: At 1200 fpm recommended maximum free area velocity
 Pressure Drop: 0.2 in.wg at 1250 fpm and 11,138 scfm
 Free Area: 8.91 sq.ft. = 56% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.



Free Area sq.ft

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.25	0.41	0.57	0.72	0.88	1.04	1.20	1.36	1.51
	24"	0.78	1.27	1.76	2.25	2.74	3.23	3.72	4.21	4.70
	36"	1.29	2.11	2.92	3.74	4.55	5.37	6.18	7.00	7.81
	48"	1.83	2.99	4.15	5.31	6.47	7.62	8.91	9.94	11.10
	60"	2.36	3.85	5.34	6.83	8.32	9.81	11.30	12.79	14.28
	72"	2.87	4.69	6.50	8.32	10.13	11.95	13.76	15.58	17.39
	84"	3.42	5.57	7.73	9.89	12.05	14.21	16.36	18.52	20.68
	96"	3.94	6.43	8.92	11.41	13.90	16.39	18.88	21.37	23.86



ABI certifies that the Model A634 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Water Penetration Ratings.

air balance

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MODEL A635

6" Deep • 35°/42° Drainable Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
BLADES: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

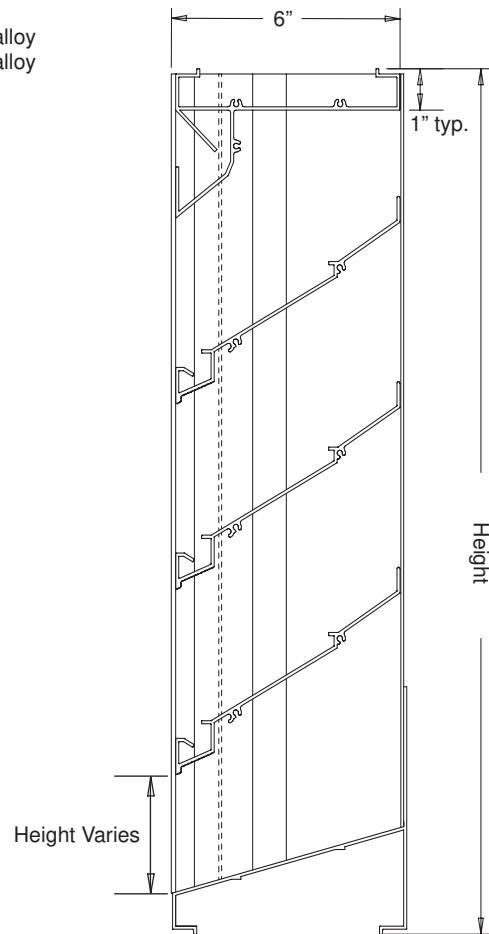
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame
 Welded Construction
 Blank-off Panels
 .125" Nominal Construction

NOTES

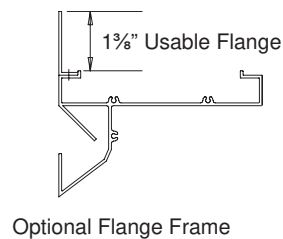
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 4 lbs./sq.ft.

LOUVER SIZES

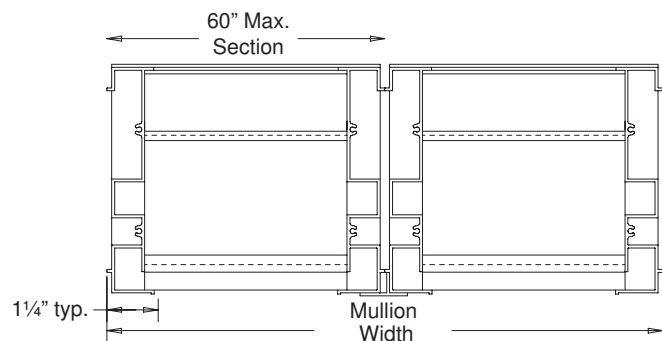
Panels	Min Panel	Max Single Panel
A635	12"W x 12"H	60"W x 96"H



Section View



Optional Flange Frame



air balance

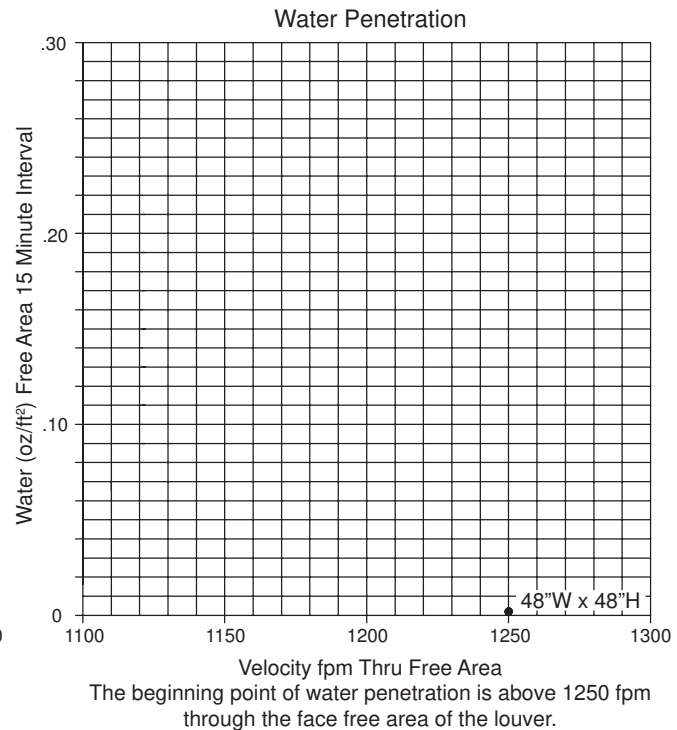
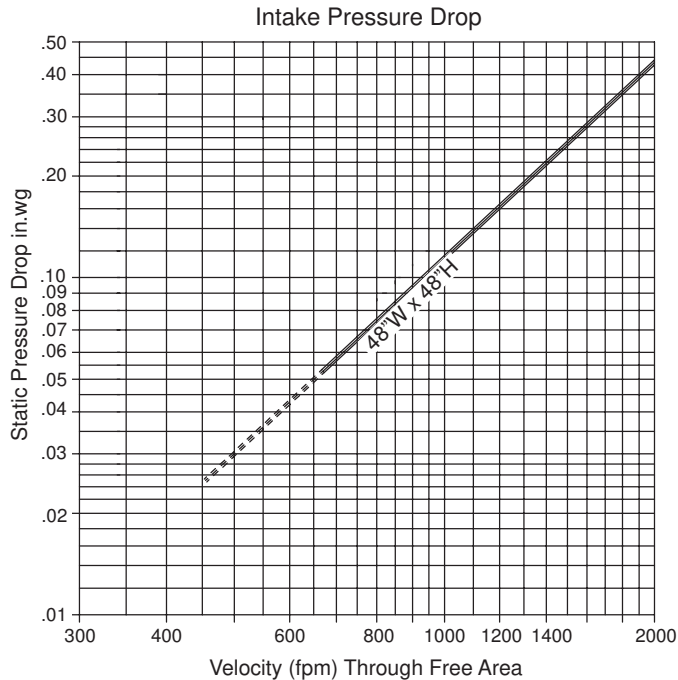
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MODEL A635

6" Deep • 35°/42° Drainable Blade • Extruded Aluminum Louver

Water Penetration: At 1200 fpm recommended free area velocity
 Pressure Drop: 0.18 in.wg at 1250 fpm and 11,213 scfm
 Free Area: 8.97 sq.ft. = 56% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.



Free Area sq.ft

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.25	0.41	0.57	0.72	0.88	1.04	1.20	1.36	1.51
	24"	0.78	1.27	1.76	2.25	2.74	3.23	3.72	4.21	4.70
	36"	1.29	2.11	2.92	3.74	4.55	5.37	6.18	7.00	7.81
	48"	1.83	2.99	4.15	5.31	6.47	7.62	8.97	9.94	11.10
	60"	2.36	3.85	5.34	6.83	8.32	9.81	11.30	12.79	14.28
	72"	2.87	4.69	6.50	8.32	10.13	11.95	13.76	15.58	17.39
	84"	3.42	5.57	7.73	9.89	12.05	14.21	16.36	18.52	20.68
	96"	3.94	6.43	8.92	11.41	13.90	16.39	18.88	21.37	23.86

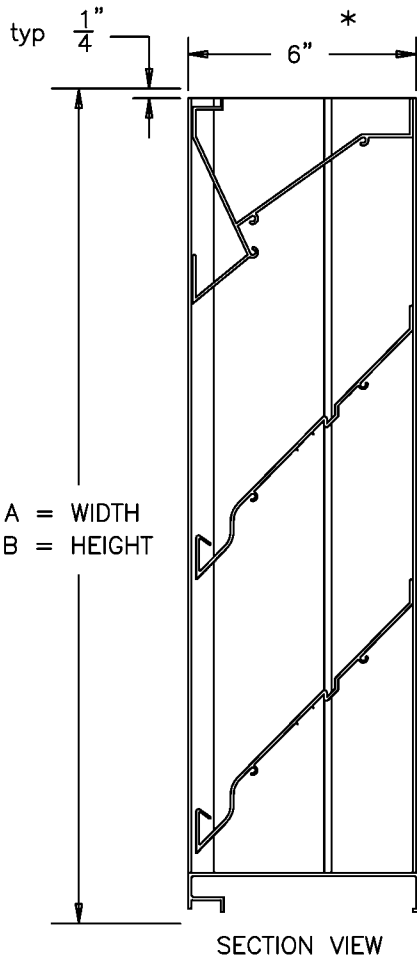


ABI certifies that the Model A635 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Water Penetration Ratings.

air balance

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EXTRUDED ALUMINUM, 6" DEEP, FIXED DRAINABLE TYPE BLADE



MODEL A645 STANDARD SPECIFICATIONS

FRAME: 6" DEEP CHANNEL, .081" THICK 6063-T5 EXTRUDED ALUMINUM ALLOY.

BLADES: .081" THICK 6063-T5 EXTRUDED ALUMINUM ALLOY.

FINISH: MILL.

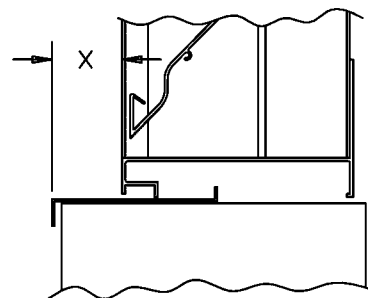
SCREEN: 1/2" REMOVABLE EXPANDED ALUMINUM BIRD SCREEN LOCATED ON INTERIOR.

MAXIMUM PANEL SIZE: 96" X 96".

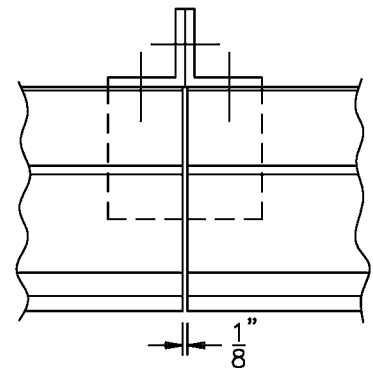
MINIMUM PANEL SIZE: 12" X 12".

DIMENSIONS: "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING SIZES. LOUVERS ARE MADE 1/2" UNDERSIZE.

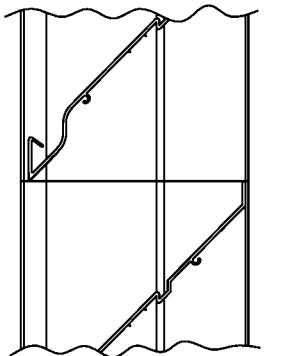
* PANELS OVER 48" WIDE WILL BE 7-1/2" DEEP DUE TO A VERTICAL INTERIOR BLADE SUPPORT ANGLE.



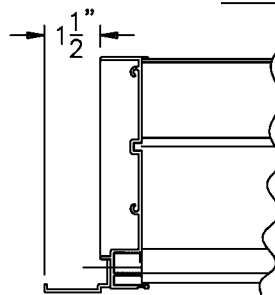
EXTENDED SILL
OPTIONAL



ARCHITECTURAL VERTICAL
MULLION OPTIONAL



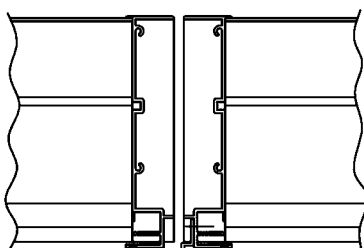
STANDARD HORIZONTAL
MULLION



FLANGED FRAME
OPTIONAL
(JAMB SHOWN)



ABI certifies that the model A645 louver shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to air performance ratings and water penetration ratings.



STANDARD VERTICAL
MULLION

abi air balance

A MESTEK COMPANY

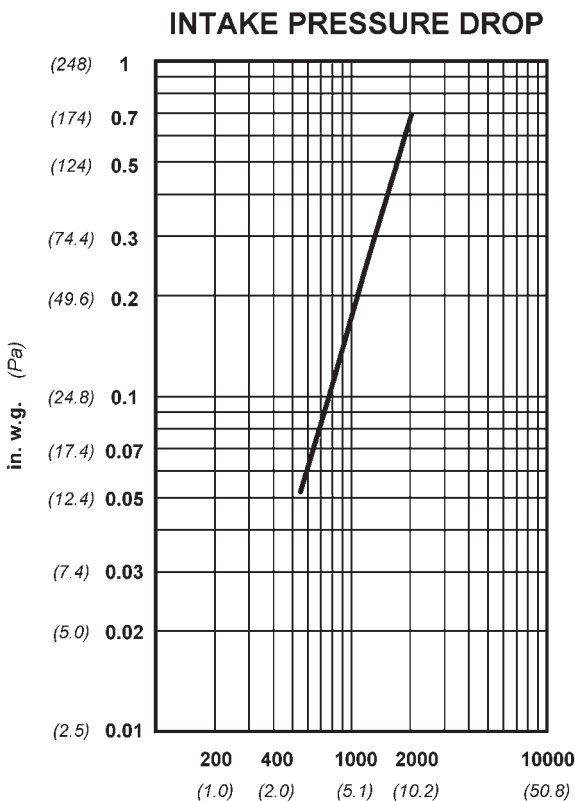
7435 INDUSTRIAL RD.
Phone (419) 865-5000

FLORENCE, KY
Fax (419) 865-1375

A645 STATIONARY LOUVER

DRN. BY	ESS	DWG. NO.	REV.
DATE	12-01-02	A645	

Water Penetration : 0.01 oz (3.0 g) at 1029 fpm (5.22 m/s) recommended free area velocity
Pressure Drop : 0.17 in wg (42.1 Pa.) at 1029 fpm (5.22 m/s) and 8232 scfm (3.89 scm/s)
Free Area : 8 sq ft (0.743 sq m) = 50% for 48" x 48" (1.22m x 1.22m) test size



VELOCITY THROUGH FREE AREA fpm (m/s)
 standard air- .075 lbs per cu ft
 Ratings do not include the effect of a wire bird screen
 Test based on a 48" x 48" test size per AMCA Standard 511



ABI certifies that the model A645 louver shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to air performance and water penetration ratings.

A645

Below is an explanation of how to use the AMCA Performance data for the recommended free area velocity of 1029 fpm (5.22 m/s).

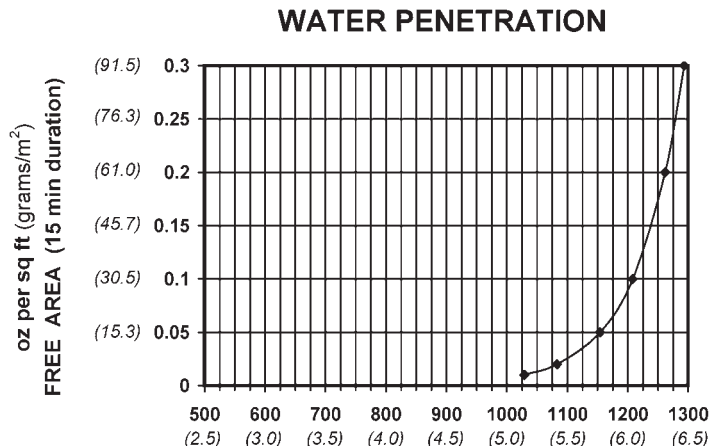
To determine minimum free area required for louver:

Step #1: Divide the required CFM flow by the maximum recommended free area velocity.

Step #2: Select the most desirable louver size, from the free area table, that meets the minimum free area requirement.

Step #3: Compare specified performance to the certified water penetration and pressure drop ratings.

		FREE AREA IN SQUARE FEET (sq meters)							
		WIDTH							
HEIGHT	in.	12	24	36	48	60	72	84	96
	mm	305	610	914	1219	1524	1829	2134	2438
	12	0.25	0.57	0.89	1.21	1.49	1.81	2.13	2.45
	305	0.023	0.053	0.083	0.112	0.138	0.168	0.198	0.228
	24	0.76	1.75	2.74	3.72	4.59	5.58	6.56	7.55
	610	0.071	0.163	0.255	0.346	0.426	0.518	0.609	0.701
	36	1.19	2.73	4.27	5.81	7.16	8.70	10.24	11.78
	914	0.111	0.254	0.397	0.540	0.665	0.808	0.951	1.094
	48	1.63	3.76	5.88	8.00	9.85	11.97	14.09	16.22
	1219	0.152	0.349	0.546	0.743	0.915	1.112	1.309	1.506
	60	2.25	5.18	8.10	11.03	13.59	16.51	19.43	22.36
	1524	0.209	0.481	0.753	1.025	1.263	1.534	1.805	2.077
	72	2.58	5.92	9.26	12.60	15.52	18.86	22.20	25.54
	1829	0.240	0.550	0.860	1.171	1.442	1.752	2.062	2.373
	84	3.07	7.04	11.02	15.00	18.48	22.46	26.43	30.41
	2134	0.285	0.654	1.024	1.394	1.717	2.087	2.455	2.825
	96	3.58	8.22	12.86	17.50	21.56	26.20	30.84	35.48
	2438	0.333	0.764	1.195	1.626	2.003	2.434	2.865	3.296



VELOCITY THROUGH FREE AREA fpm (m/s)
 Both maximum recommended free area velocity and beginning of water penetration are 1029 fpm at standard air -.075 lbs per cu ft. The above water penetration data is based on mill finish, 48" x 48" test size per AMCA Standard 511.

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height with a single panel. Unusually high wind loading may require structural supports on non-multiple wide and multiple high assemblies. **Structural supports and mounting accessories are not supplied as a standard.**

Example: Given: 15000 CFM design flow

Step #1:

$$\begin{aligned} \text{min. free area} &= \frac{\text{Design CFM}}{\text{Max. Recommended Velocity}} \\ &= \frac{15000}{1029} = 14.58 \text{ sq ft} \end{aligned}$$

Step #2: From the free area table above the approximate louver size is 48" x 84" = (15 sq ft)

MODEL A650

6" Deep • Drainable Blade • Continuous Line • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

EXTERIOR FRAME: .081" thick; 6063-T6/T52 extruded aluminum alloy
BLADES: .125" thick; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

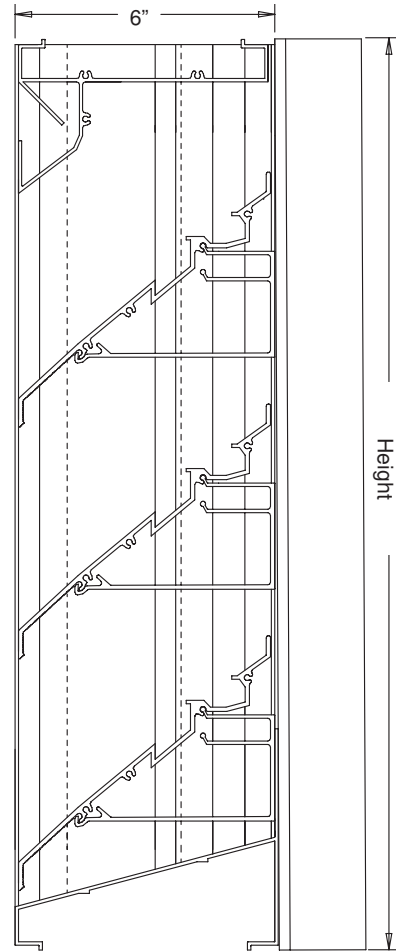
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame
 Welded Construction
 Blank-off Panels

NOTES

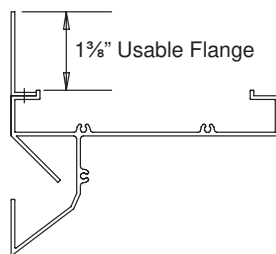
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 4 lbs./sq.ft.

LOUVER SIZES

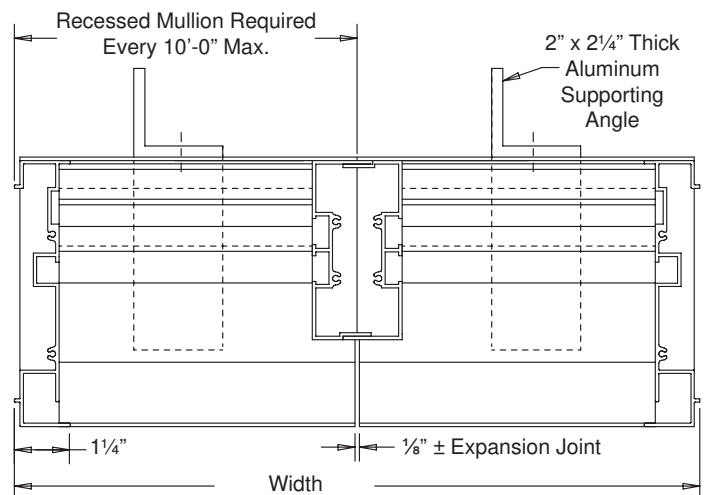
Panels	Min Panel	Max Single Panel
A650	12"W x 12"H	120"W x 60"H 60"W x 120"H



Section View



Optional Flange Frame



air balance

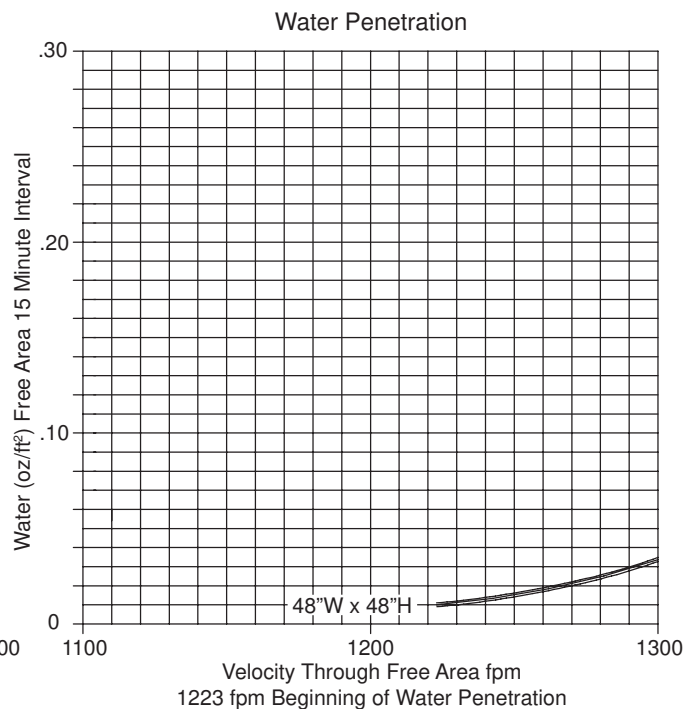
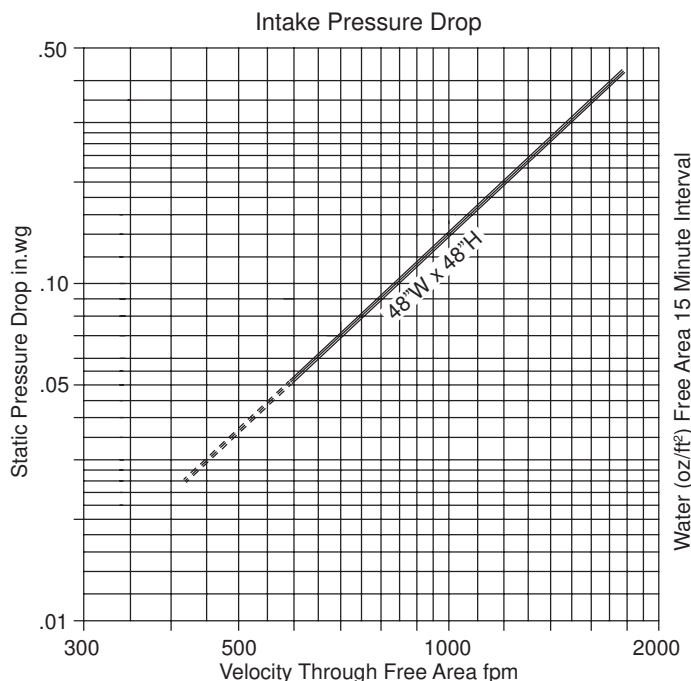
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MODEL A650

6" Deep • Drainable Blade • Continuous Line • Extruded Aluminum Louver

Water Penetration: 1200 fpm free area velocity
 Pressure Drop: 0.09 in.wg at 800 fpm and 6720 scfm
 Free Area: 8.40 sq.ft. = 53% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.



Free Area sq.ft

		Width																		
		12"	18"	24"	30"	36"	42"	48"	54"	60"	66"	72"	78"	84"	90"	96"	102"	108"	114"	120"
Height	12"	0.23	0.38	0.52	0.67	0.81	0.96	1.10	1.25	1.39	1.54	1.68	1.83	1.97	2.12	2.26	2.41	2.56	2.70	2.85
	24"	0.77	1.26	1.75	2.23	2.72	3.21	3.70	4.18	4.67	5.16	5.64	6.13	6.62	7.11	7.59	8.08	8.57	9.06	9.54
	36"	1.24	2.02	2.81	3.59	4.37	5.15	5.94	6.72	7.50	8.29	9.07	9.85	10.64	11.42	12.20	12.98	13.77	14.55	15.33
	48"	1.78	2.91	4.03	5.16	6.28	7.41	8.40	9.66	10.78	11.91	13.03	14.16	15.28	16.41	17.53	18.66	19.78	20.91	22.03
	60"	2.33	3.79	5.26	6.73	8.20	9.67	11.14	12.61	14.08	15.54	17.01	18.48	19.95	21.42	22.89	24.36	25.83	27.29	28.76
	72"	2.82	4.60	6.38	8.16	9.94	11.72	13.50	15.28	17.06	18.83	20.61	22.39	24.17	25.95	27.73	29.51	31.29	33.07	34.85
	84"	3.30	5.38	7.46	9.54	11.62	13.70	15.78	17.87	19.95	22.03	24.11	26.19	28.27	30.35	32.44	34.52	36.60	38.68	40.76
	96"	4.02	6.56	9.11	11.65	14.19	16.73	19.27	21.81	24.35	26.89	29.43	31.97	34.51	37.06	39.60	42.14	44.68	47.22	49.76
	108"	4.38	7.14	9.91	12.68	15.44	18.21	20.97	23.74	26.50	29.27	32.04	34.80	37.57	40.33	43.10	45.86	48.63	51.39	54.16
	120"	4.88	7.96	11.04	14.13	17.21	20.29	23.37	26.45	29.54	32.62	35.70	38.78	41.87	44.95	48.03	51.11	54.19	57.28	60.36



Air Balance certifies that the Model A650 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Water Penetration Ratings.

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MODEL A655

6" Deep • 45° Non-Drainable Blade • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
BLADES: .125" thick nominal; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

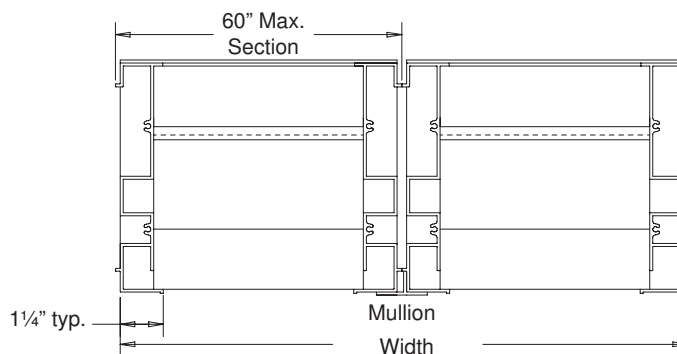
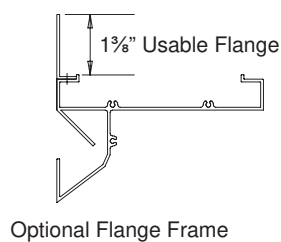
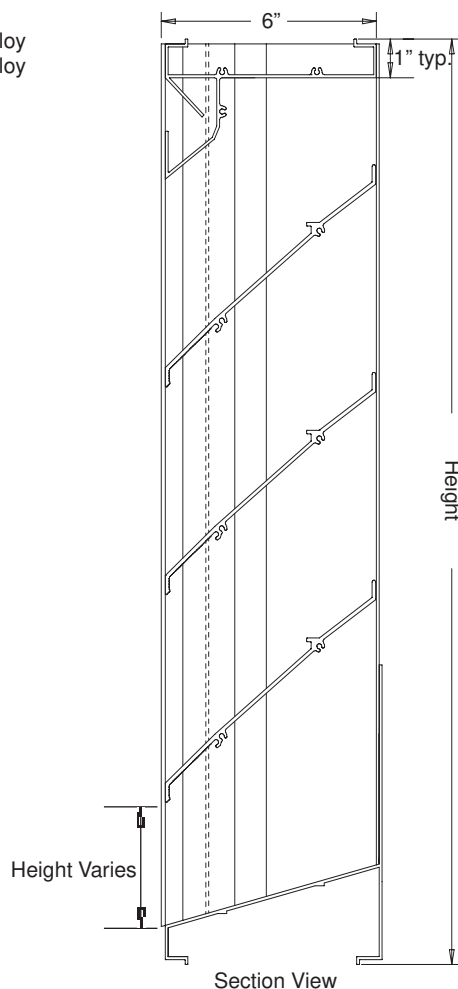
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame
 Welded Construction
 Blank-off Panels
 .125" Nominal Construction

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 4.5 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A655	12"W x 12"H	60"W x 96"H



air balance

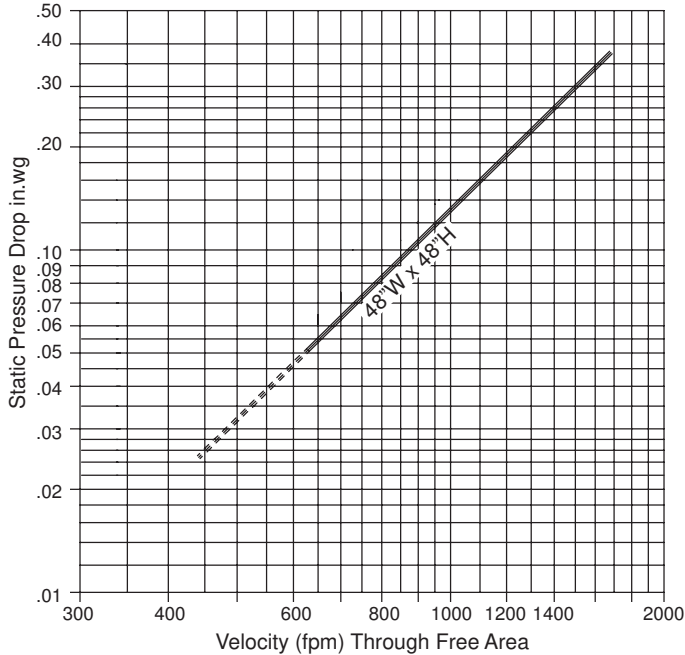
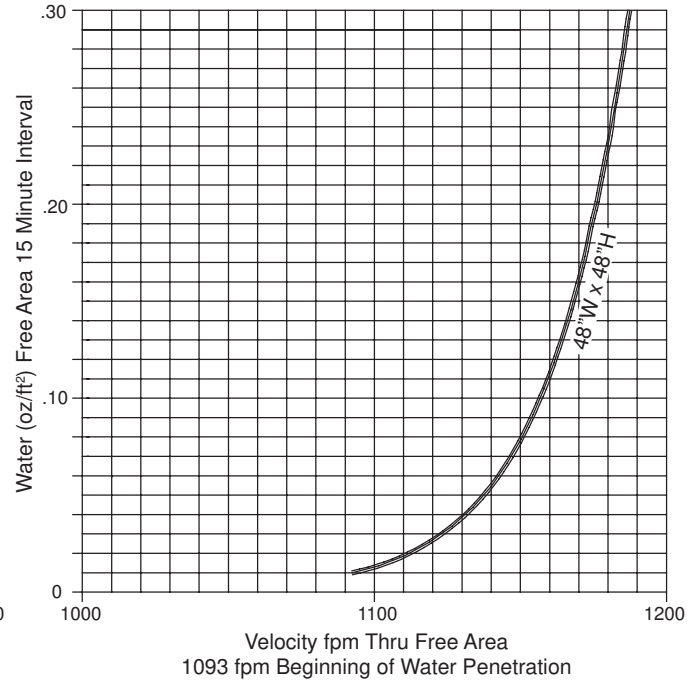
Dampers  Louvers
 UL Life Safety Products
 Division of Mestek
 Member of AMCA

MODEL A655

6" Deep • 45° Non-Drainable Blade • Extruded Aluminum Louver

Water Penetration: At 1000 fpm recommended maximum free area velocity
 Pressure Drop: 0.16 in.wg at 1093 fpm and 9541 scfm
 Free Area: 8.73 sq.ft. = 55% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.

Intake Pressure Drop**Water Penetration****Free Area sq.ft**

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.25	0.41	0.57	0.73	0.89	1.05	1.21	1.36	1.52
	24"	0.77	1.26	1.75	2.24	2.73	3.22	3.71	4.20	4.69
	36"	1.29	2.10	2.92	3.73	4.55	5.36	6.18	6.99	7.81
	48"	1.81	2.96	4.10	5.24	6.39	7.53	8.73	9.81	10.96
	60"	2.36	3.85	5.34	6.83	8.32	9.81	11.30	12.79	14.28
	72"	2.86	4.67	6.48	8.29	10.10	11.91	13.72	15.53	17.34
	84"	3.38	5.51	7.64	9.77	11.91	14.04	16.17	18.30	20.44
	96"	4.09	6.68	9.26	11.85	14.43	17.01	19.60	22.18	24.77



Air Balance certifies that the Model A655 shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with the AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified ratings seal applies to Air Performance Ratings and Water Penetration Ratings.

air balance

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MODEL A6DHP

6" Deep Stationary Drain Blade • High Performance • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
BLADES: .081" thick nominal; 6063-T6/T52 extruded aluminum alloy
ASSEMBLY: Mechanically fastened
SCREEN: ½" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1⅜" Usable Flange Frame
 Welded Construction
 Blank-off Panels
 .125 Nominal Construction

NOTES

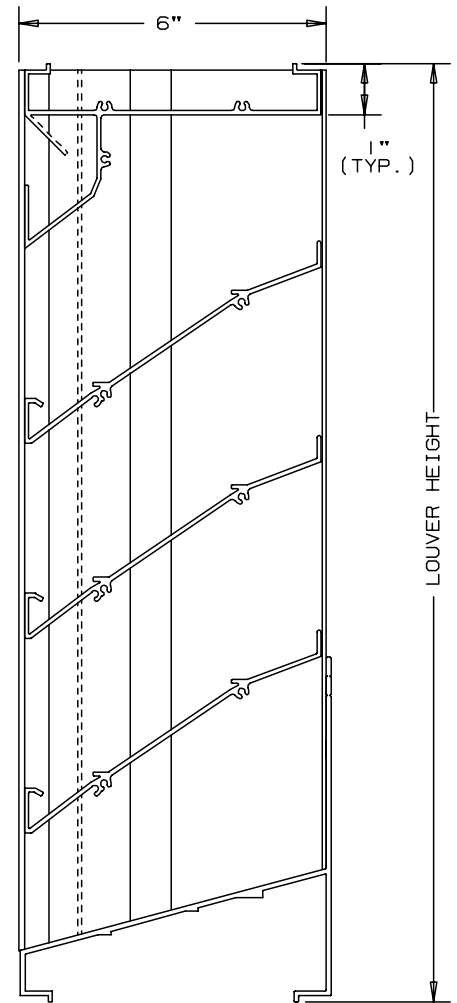
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undercut.
2. Shipping weight approximately 4 lbs./sq.ft.

LOUVER SIZES

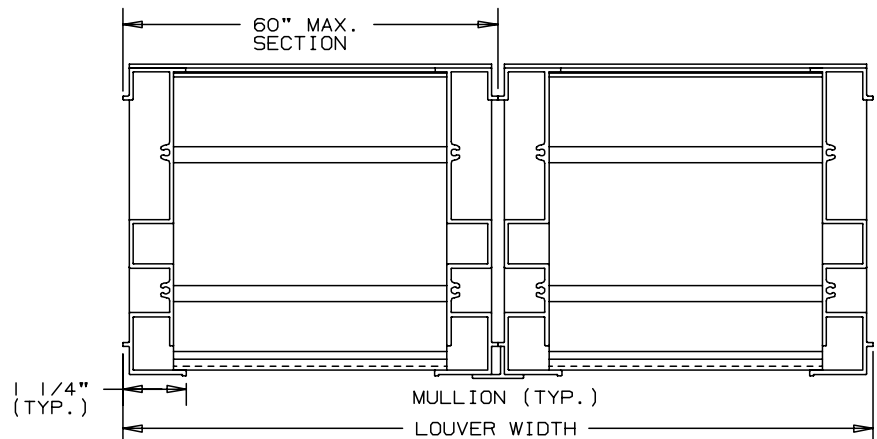
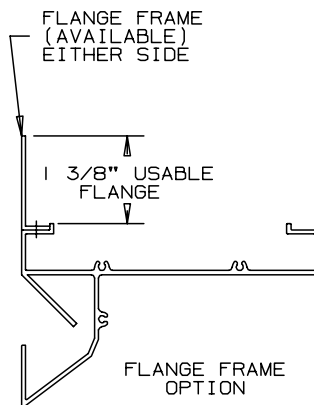
Panels	Min Panel	Max Single Panel
A6DHP	12"W x 12"H	60"W x 96"H

LOUVER PERFORMANCE STATEMENT

Louver Model A6DHP shall be fabricated to provide a minimum of (63%), 10.06 square feet of free area for a 48" x 48" size louver



NOT TO SCALE



air balance

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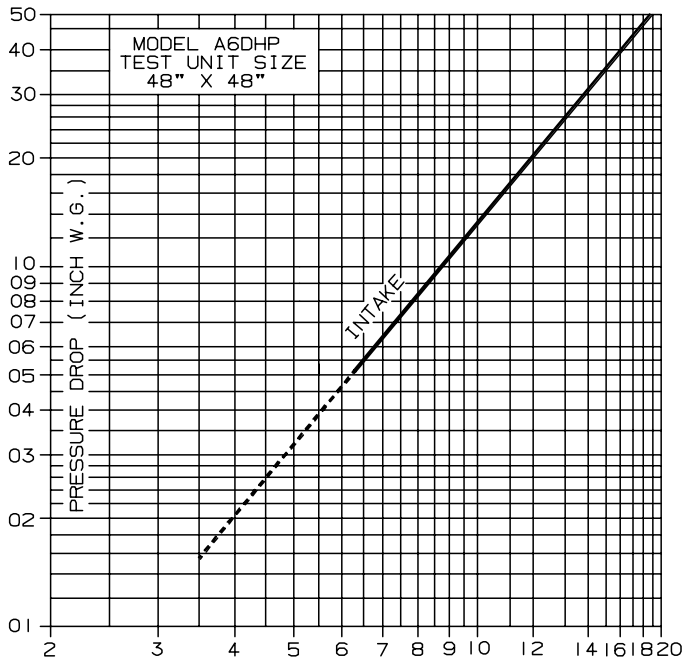
MODEL A6DHP

6" Deep Stationary Drain Blade • High Performance • Extruded Aluminum Louver

TESTS OF A 48" X 48" SAMPLE ACCORDING TO AMCA STANDARD 500-L SHOWS THE BEGINNING POINT OF WATER PENETRATION TO BE 1103 FPM THROUGH THE FREE AREA OF THE LOUVER, WITH LESS THAN .13" W.G. PRESSURE DROP AT 1000 FPM (INTAKE).

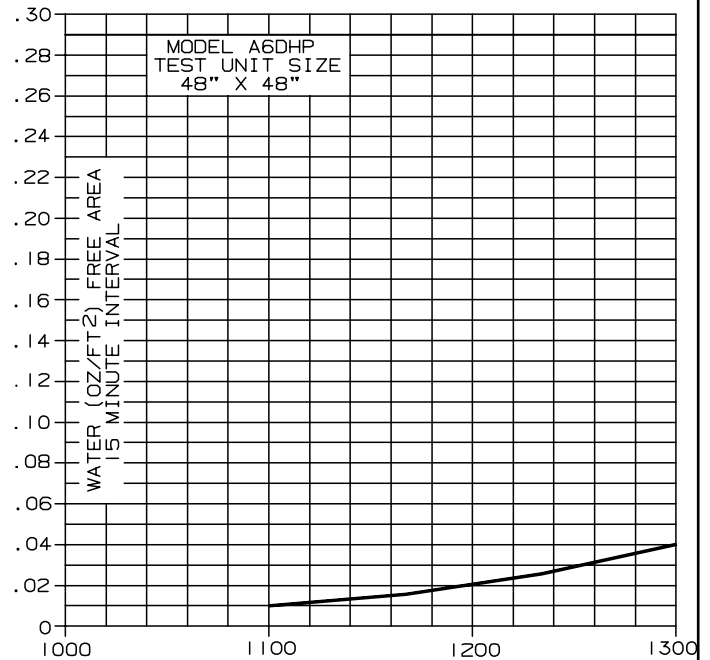
Ratings do not include the effect of birdscreen

Pressure Drop



VELOCITY (FPM) X 100 Thru Free Area

Water Penetration



VELOCITY (FPM) Thru Free Area
1103 (FPM) Beginning Of Water Penetration

Intake Air Converted To Standard Air Density
Tested To AMCA Figure 5.5

Free Area sq.ft

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	.29	.47	.66	.84	1.03	1.21	1.39	1.58	1.76
	24"	.90	1.47	2.04	2.60	3.17	3.74	4.31	4.88	5.45
	36"	1.51	2.46	3.41	4.37	5.32	6.27	7.23	8.18	9.13
	48"	2.10	3.43	4.76	6.09	7.42	8.75	10.06	11.41	12.73
	60"	2.68	4.38	6.07	7.76	9.46	11.15	12.84	14.54	16.23
	72"	3.29	5.37	7.45	9.52	11.60	13.68	15.76	17.84	19.92
	84"	3.90	6.36	8.82	11.29	13.75	16.21	18.67	21.14	23.60
	96"	4.51	7.35	10.20	13.05	15.90	18.74	21.59	24.44	27.28

air balance

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MODEL BV15

1½" Deep • 45° Blades • Flange Frame • Extruded Aluminum Brick Vent

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .125 thick extruded aluminum alloy
BLADE: .125 thick extruded aluminum alloy
SCREEN: Aluminum mesh insect screen 18x16
FINISH: Clear anodized

OPTIONS

Finish - Baked Powder Polyester, or Fluoropon

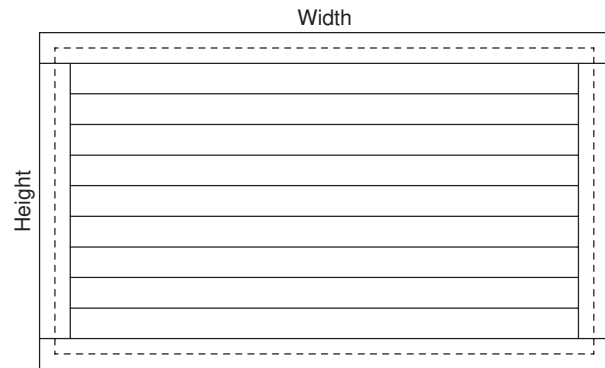
NOTES

1. "A" width and "B" height are opening dimensions.
2. Shipping weight approximately 6.0 lbs./sq.ft.

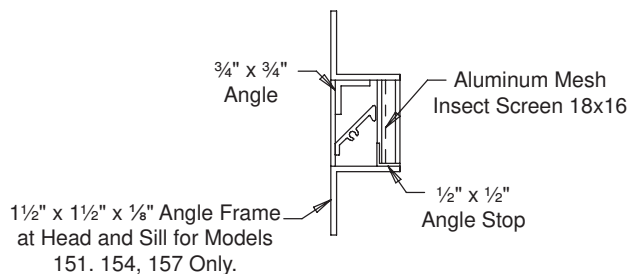
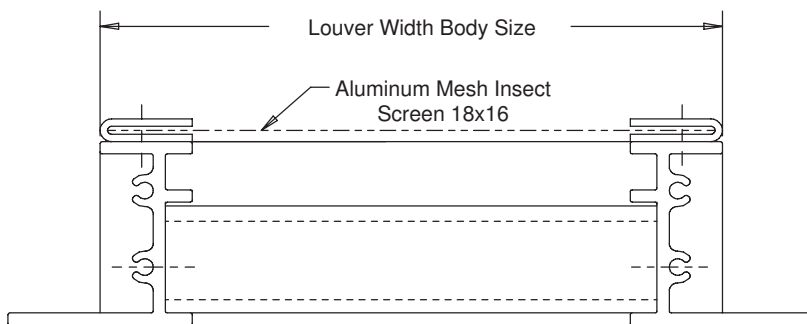
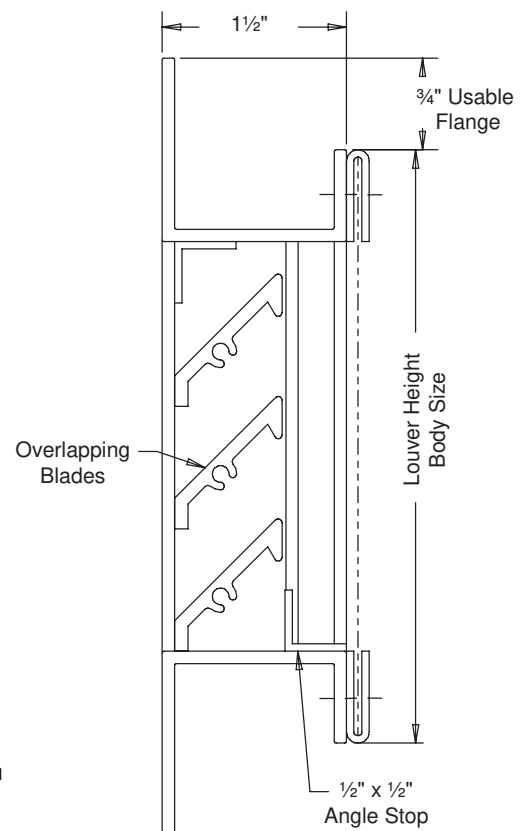
STOCK SIZES

No.	Body Size	Free Area (sq.in.)
151	8"W x 2½"H	4.48
152	8"W x 4¾"H	7.01
153	8"W x 7¾"H	15.88
154	16½"W x 2½"H	10.33
155	16½"W x 4¾"H	16.18
156	16½"W x 7¾"H	36.64
157	12"W x 2½"H	7.23
158	12"W x 4¾"H	11.32
159	24"W x 4¾"H	24.16
162	24"W x 7¾"H	54.96

For sizes not listed, contact customer service.



Full Head and Sill with Jambs Contained Within



MODEL BV15

1½" Deep • 45° Blades • Flange Frame • Extruded Aluminum Brick Vent

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MODEL BV40

4" Deep • 45° Blades • Extruded Aluminum Brick Vent

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .125 thick extruded aluminum alloy
BLADE: .125 thick extruded aluminum alloy
SCREEN: 18x16 Aluminum mesh insect screen
FINISH: Clear anodized

OPTIONS

Finish - Baked Powder Polyester, or Fluoropon

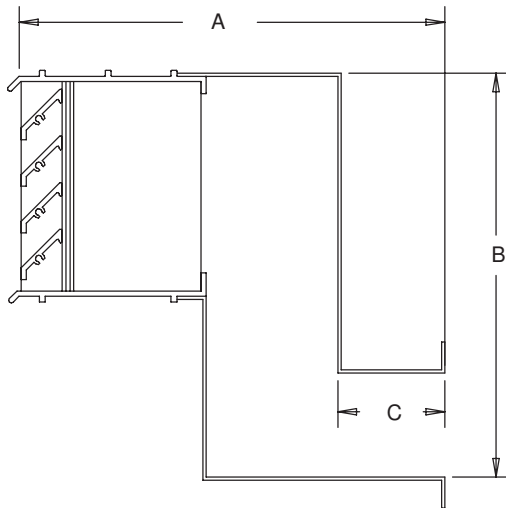
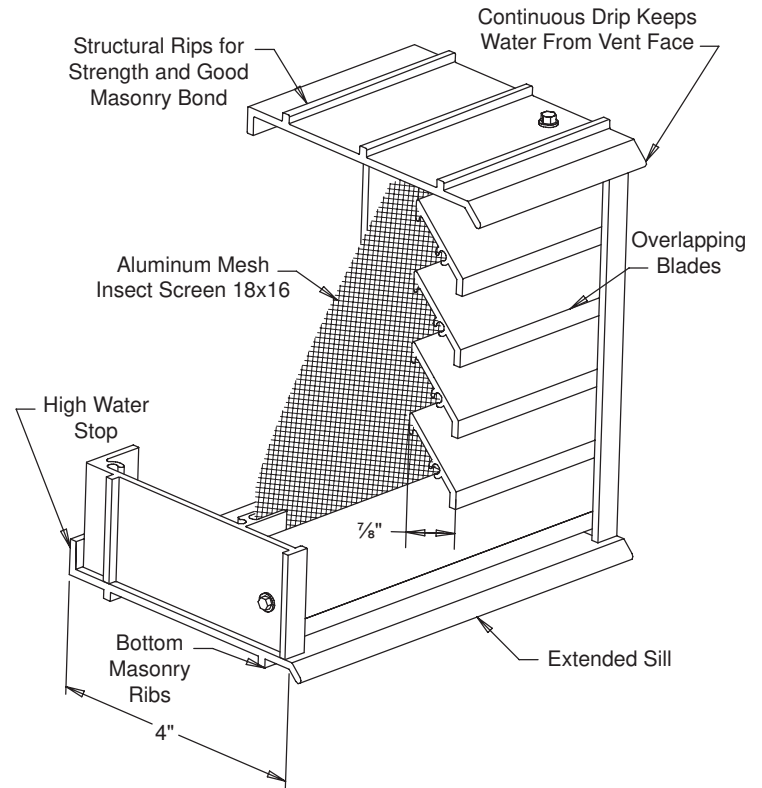
NOTES

1. "A" width and "B" height are opening dimensions.
2. Shipping weight approximately 6.0 lbs./sq.ft.

STOCK SIZES

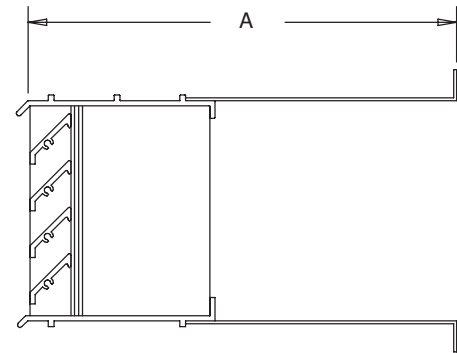
No.	Body Size	Free Area (sq.in.)
133	8"W x 2½"H	5.47
135	8"W x 4¾"H	9.93
140	8"W x 7¾"H	20.89
170	16½"W x 2½"H	13.10
172	16½"W x 4¾"H	24.04
174	16½"W x 7¾"H	45.79
127	12"W x 2½"H	9.07
125	12"W x 4¾"H	16.56
245	24"W x 4¾"H	36.43
247	24"W x 7¾"H	69.55

For sizes not listed, contact customer service.



"Z" Ducts

Fastened securely to vent 24-GA galvanized steel standard. Use when space to be vented is below grade. Providing dimensions A, B, and C.



Straight Ducts

Fastened securely to vent 24-GA galvanized steel standard. Specify wall thickness, A dimension.

MODEL BV40

4" Deep • 45° Blades • Extruded Aluminum Brick Vent

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MODEL A445A

4" Deep • Drainable • Adjustable Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** .080" thick nominal; 6063-T6/T52 extruded aluminum alloy**BLADES:** .080" thick nominal ; 6063-T6/T52 extruded aluminum alloy**ASSEMBLY:** Welded**FACE OF LOUVER:** Full width sill with drain head and non-drain blades contained within the drain jambs.**LINKAGE:** Extruded aluminum, concealed in channel out of airstream. Pivots are .50 dia. machined steel. Cadmium plated and chromate treated. Pivots rotate in a celcon bearing. A .312" dia. Aluminum linkage rod is locked to the pivot by a 1/4 - 20 set screw with epoxy locking patch.**SHAFT:** .50 dia. aluminum "Pin-Lock" Rod.**BLADE SEALS:** Extruded silicone rubber seal at blade edge.**JAMB SEALS:** Polyurethane**SCREEN:** 1/2" x .051" flattened aluminum bird screen**FINISH:** Mill**OPTIONS**

Finish - Baked Powder Polyester , Kynar, or Anodize

Variety of Bird and Insect Screen

1 3/8" Usable Flange Frame (Front Face Only)

Blank-off Panels

Actuators (Electric, Pneumatic, Manual, etc.)

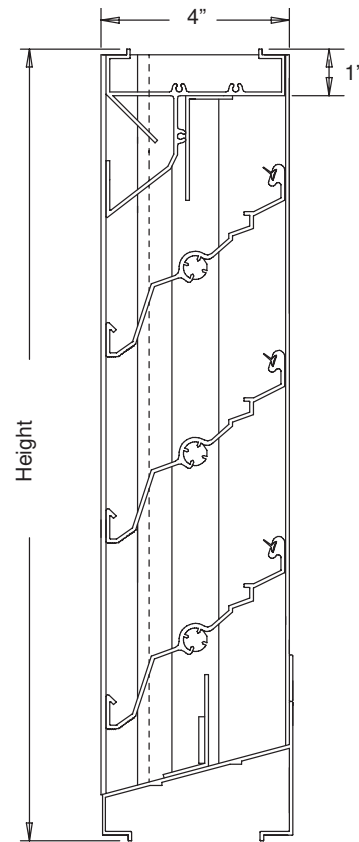
NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.

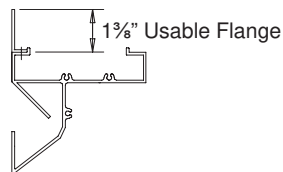
2. Shipping weight approximately 5.0 lbs./sq.ft.

LOUVER SIZES

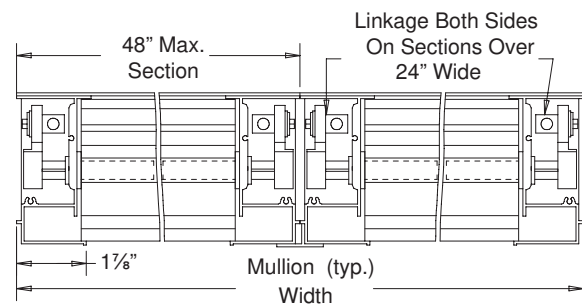
Panels	Min Panel	Max Single Panel
A445A	12"W x 12"H	48"W x 96"H



Section View



Optional Flange Frame



air balance

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MODEL A445A

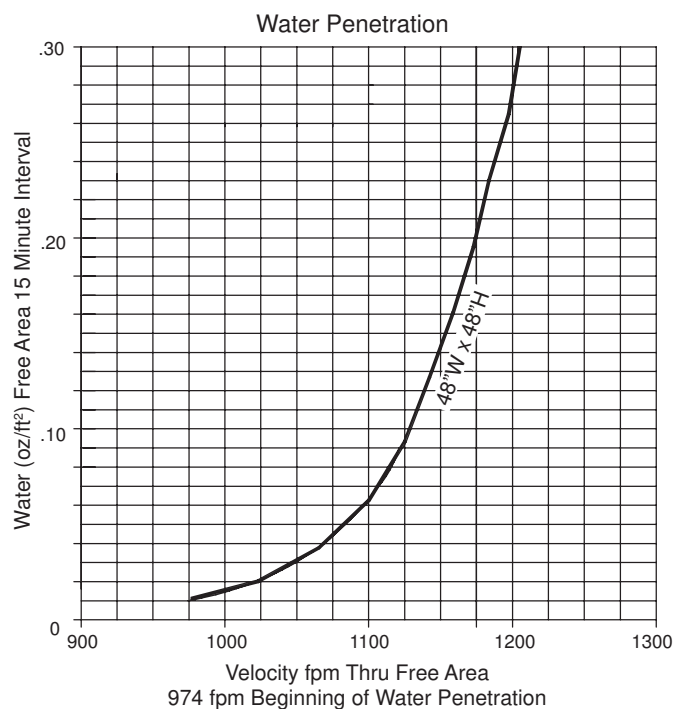
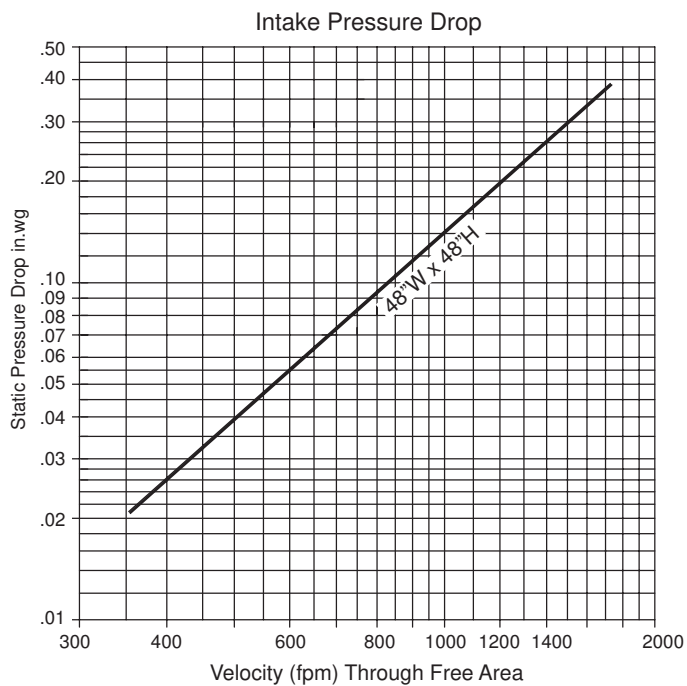
4" Deep • Drainable • Adjustable Extruded Aluminum Louver

Water Penetration: At 900 fpm recommended maximum free area velocity

Pressure Drop: 0.14 in.wg at 1000 fpm and 7070 scfm

Free Area: 7.07 sq.ft. = 44% for 48"W x 48"H test size

Ratings do not include effects of birdscreen



Free Area sq.ft

		Width						
		12"	18"	24"	30"	36"	42"	48"
Height	12"	0.17	0.31	0.44	0.57	0.70	0.83	0.96
	24"	0.56	0.98	1.41	1.83	2.25	2.67	3.10
	36"	0.93	1.63	2.33	3.02	3.72	4.42	5.12
	48"	1.28	2.23	3.19	4.14	5.10	6.06	7.07
	60"	1.64	2.87	4.10	5.33	6.57	7.80	9.03
	72"	1.99	3.49	4.99	6.48	7.98	9.47	10.97
	84"	2.35	4.11	5.87	7.63	9.40	11.16	12.92
	96"	2.74	4.79	6.84	8.89	10.95	13.00	15.05

air balance

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MODEL A455A

4" Deep • Non-Drainable • Adjustable Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** .080" thick nominal; 6063-T6/T52 extruded aluminum alloy
- BLADES:** .080" thick nominal; 6063-T6/T52 extruded aluminum alloy
- FACE OF LOUVER:** Full width sill with drain head and non-drain blades contained within the drain jambs
- LINKAGE:** Extruded aluminum, concealed in channel out of airstream. Pivots are .50 dia. machined steel. Cadmium plated and chromate treated. Pivots rotate in a celcon bearing. A .312" dia. Aluminum linkage rod is locked to the pivot by a 1/4 - 20 set screw with epoxy locking patch.
- SHAFT:** .50 dia. Aluminum "Pin-Lock" Rod
- BLADE SEALS:** Extruded silicone rubber seal at blade edge
- JAMB SEALS:** Polyurethane
- SCREEN:** 1/2" x .051" flattened aluminum birdscreen
- FINISH:** Mill

OPTIONS

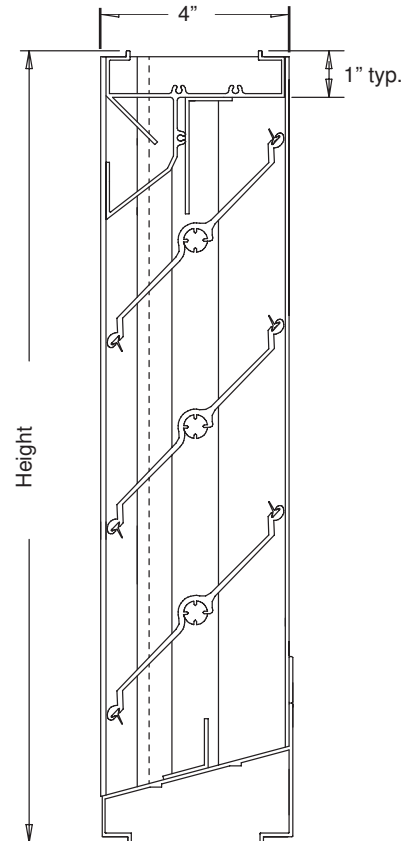
Finish - Baked Powder Polyester, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame (Front Face Only)
 Blank-off Panels
 Actuators (Electric, Pneumatic, Manual, etc.)

NOTES

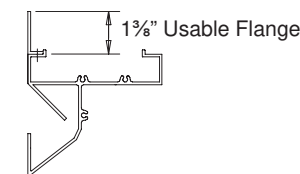
- "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
- Shipping weight approximately 5.0 lbs./sq.ft.

LOUVER SIZES

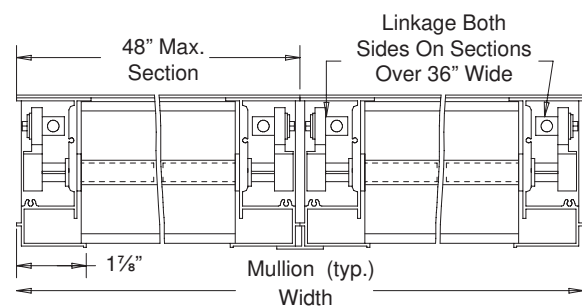
Panels	Min Panel	Max Single Panel
A455A	12"W x 12"H	48"W x 96"H



Section View



Optional Flange Frame



air balance

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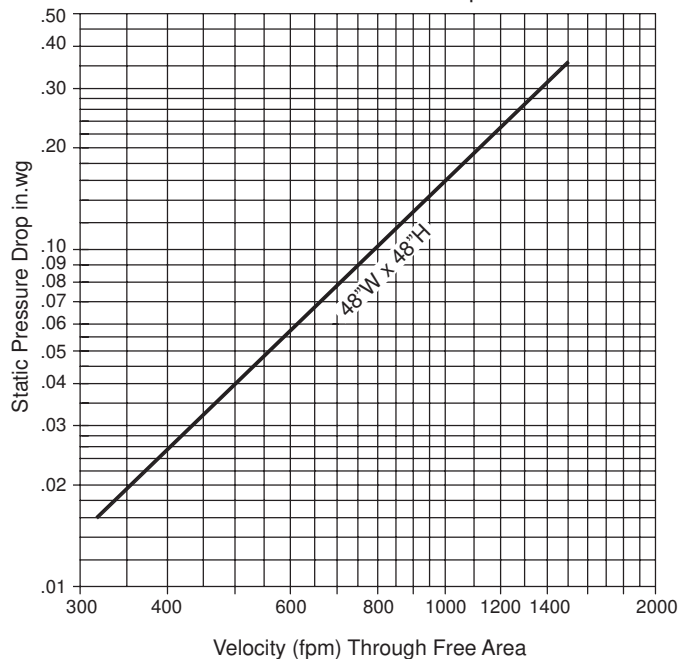
MODEL A455A

4" Deep • Non-Drainable • Adjustable Extruded Aluminum Louver

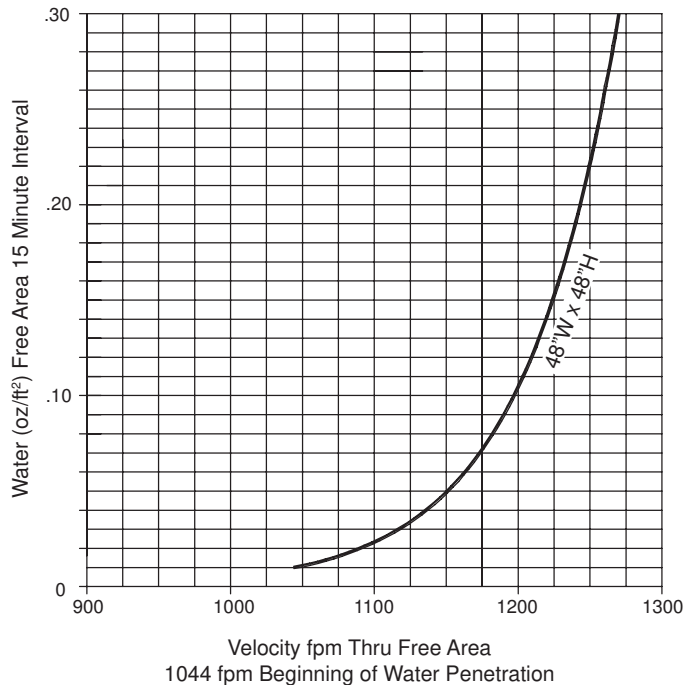
Water Penetration: 1000 fpm maximum free area velocity
 Pressure Drop: 0.16 in.wg at 1000 fpm and 7141 scfm
 Free Area: 6.84 sq.ft. = 43% for 48"W x 48"H test size

Ratings do not include effects of birdscreen

Intake Pressure Drop



Water Penetration



Free Area sq.ft.

		Width						
		12"	18"	24"	30"	36"	42"	48"
Height	12"	0.15	0.27	0.39	0.50	0.62	0.74	0.85
	24"	0.50	0.88	1.26	1.63	2.01	2.39	2.77
	36"	0.85	1.49	2.13	2.77	3.40	4.04	4.68
	48"	1.20	2.10	3.00	3.90	4.80	5.70	6.84
	60"	1.55	2.71	3.87	5.03	6.19	7.35	8.51
	72"	1.90	3.32	4.74	6.16	7.58	9.00	10.43
	84"	2.24	3.93	5.61	7.29	8.98	10.66	12.34
	96"	2.59	4.54	6.48	8.42	10.37	12.31	14.26

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MODEL A488A

Extruded Aluminum Louver • 6" Deep • Non-Drainable • Adjustable Blades

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** .080" thick; 6063-T6/T52 extruded aluminum alloy
BLADES: .080" thick; 6063-T6/T52 extruded aluminum alloy
FACE OF LOUVER: Full width sill and drain head and non-drain blades contained within the drain jambs
LINKAGE: Extruded aluminum, concealed in channel out of airstream. Pivots are .50 dia. machined steel. Cadmium plated and chromate treated. Pivots rotate in a celcon bearing. A .312" dia. Aluminum linkage rod is locked to the pivot by a 1/4 - 20 set screw with epoxy locking patch.
SHAFT: .50 dia. aluminum "Pin-Lock" Rod
BLADE SEALS: Extruded silicone rubber seal at blade edge
JAMB SEALS: Polyurethane
SCREEN: 1/2" x .051" flattened aluminum bird screen
FINISH: Mill

OPTIONS

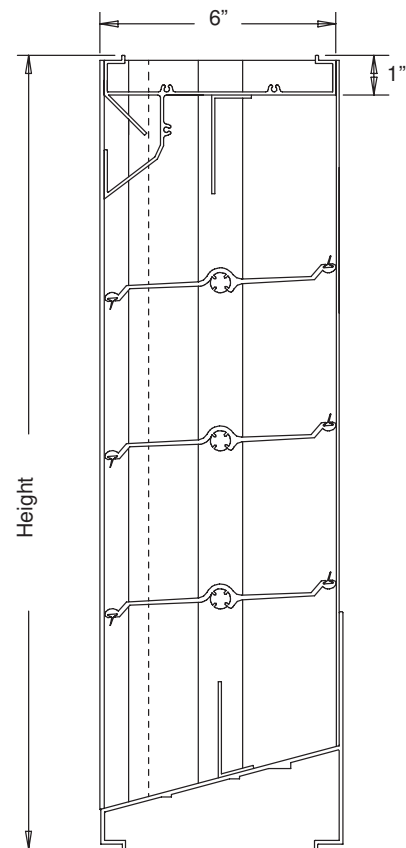
Finish - Baked Powder Polyester, Kynar, or Anodize
 Variety of Bird and Insect Screen
 1 3/8" Usable Flange Frame
 Blank-off Panels
 Actuators (Electric, Pneumatic, Manual, etc.)

NOTES

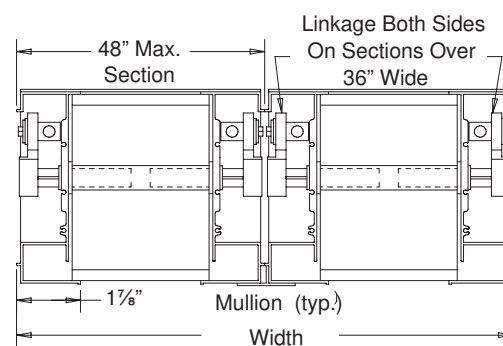
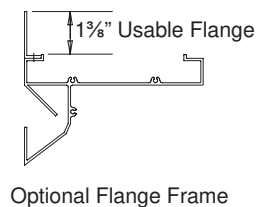
- "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
- Shipping weight approximately 5.0 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A488A	12"W x 12"H	48"W x 96"H



Section View



air balance

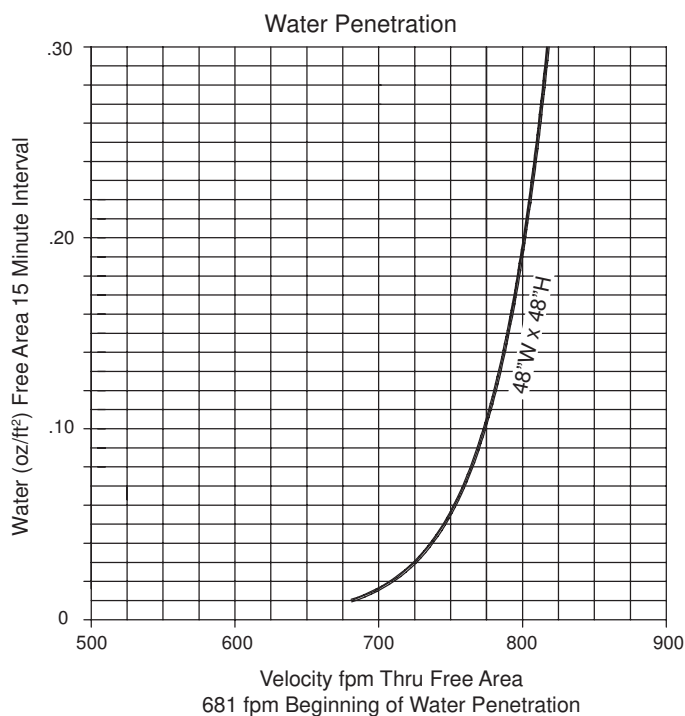
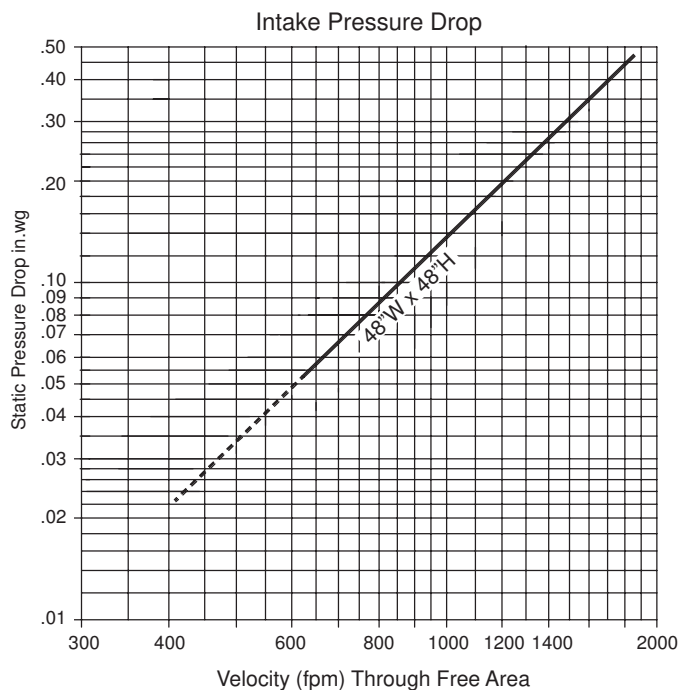
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MODEL A488A

Extruded Aluminum Louver • 6" Deep • Non-Drainable • Adjustable Blades

Water Penetration: 600 fpm maximum free area velocity
 Pressure Drop: 0.14 in.wg at 1000 fpm and 10,710 scfm
 Free Area: 10.71 sq.ft. = 67% for 48"W x 48"H test size

Ratings do not include effects of birdscreen.



Free Area sq.ft.

		Width						
		12"	18"	24"	30"	36"	42"	48"
Height	12"	0.22	0.39	0.56	0.73	0.90	1.07	1.24
	24"	0.79	1.38	1.97	2.56	3.15	3.74	4.33
	36"	1.35	2.36	3.37	4.38	5.39	6.40	7.41
	48"	1.91	3.34	4.77	6.21	7.64	9.07	10.71
	60"	2.47	4.32	6.18	8.03	9.89	11.74	13.59
	72"	3.03	5.31	7.58	9.86	12.13	14.41	16.68
	84"	3.59	6.29	8.99	11.68	14.38	17.07	19.77
	96"	4.16	7.27	10.39	13.51	16.63	19.74	22.86

air balance

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MODEL A635A

6" Deep • Drainable Blade • Adjustable Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** .080" thick nominal; 6063-T6/T52 extruded aluminum alloy**BLADES:** .080" thick nominal; 6063-T6/T52 extruded aluminum alloy**FACE OF LOUVER:** Full width sill with drain head and drain blades contained within the drain jambs.**LINKAGE:** Extruded aluminum, concealed in channel out of airstream. Pivots are .50 dia. machined steel. Cadmium plated and chromate treated. Pivots rotate in a celcon bearing. A .312" dia. Aluminum linkage rod is locked to the pivot by a 1/4 - 20 set screw with epoxy locking patch.**SHAFT:** .50 dia. aluminum "Pin-Lock" Rod.**BLADE SEALS:** Extruded silicone rubber seal at blade edge.**JAMB SEALS:** Polyurethane**SCREEN:** 1/2" x .051" flattened aluminum bird screen**FINISH:** Mill**OPTIONS**

Finish - Baked Powder Polyester, Kynar, or Anodize

Variety of Bird and Insect Screen

1 3/8" Usable Flange Frame

Blank-off Panels

Actuators (Electric, Pneumatic, Manual, etc.)

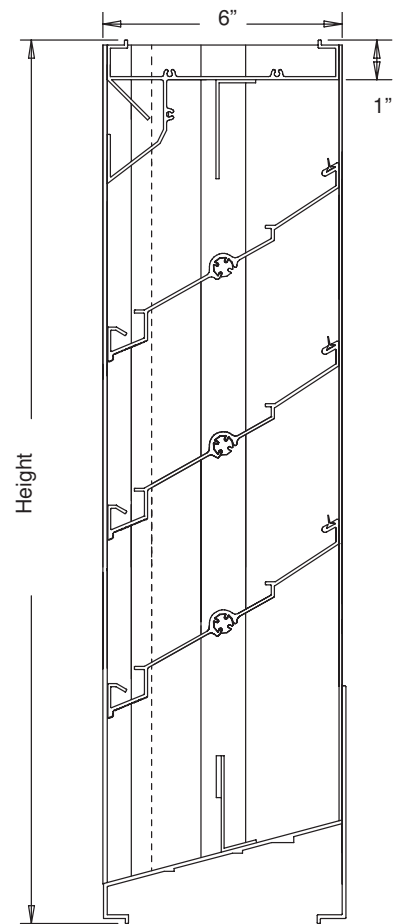
NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.

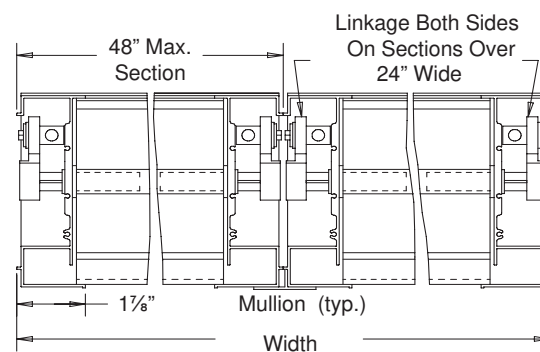
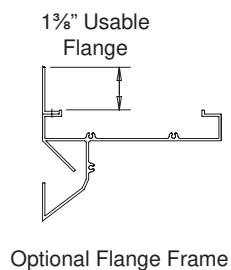
2. Shipping weight approximately 5.6 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A635A	12"W x 12"H	48"W x 96"H



Section View



air balance

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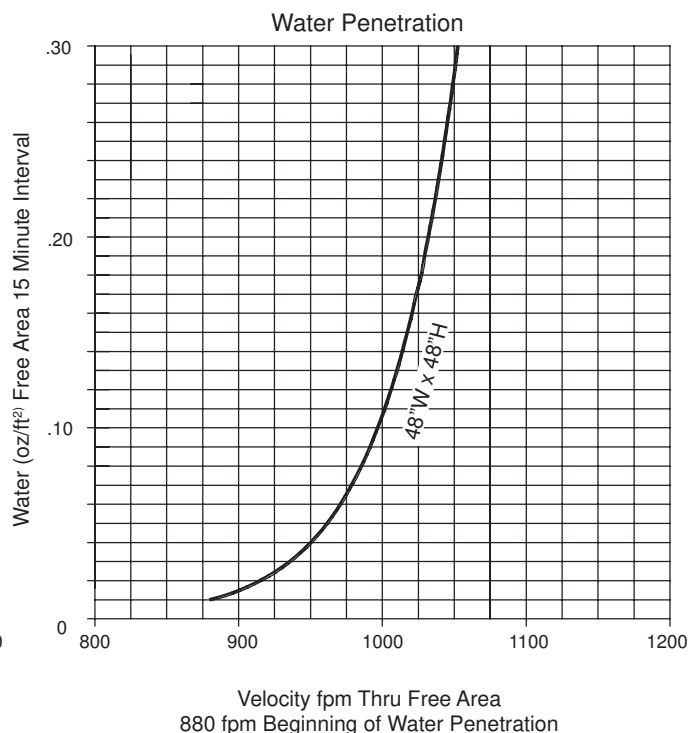
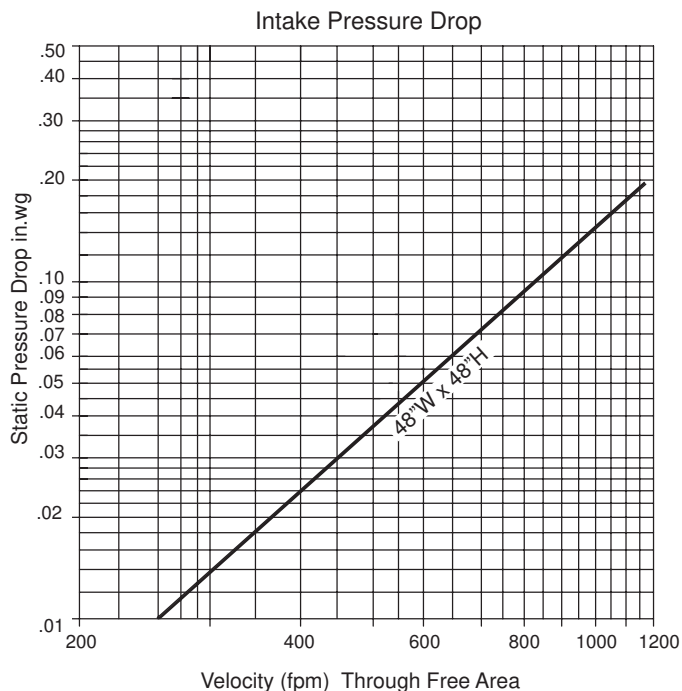
MODEL A635A

6" Deep • Drainable Blade • Adjustable Extruded Aluminum Louver

Water Penetration: 800 fpm recommended maximum free area velocity

Pressure Drop: 0.145 in.wg at 1000 fpm and 7550 scfm

Free Area: 8.58 sq.ft. = 54% for 48"W x 48"H test size

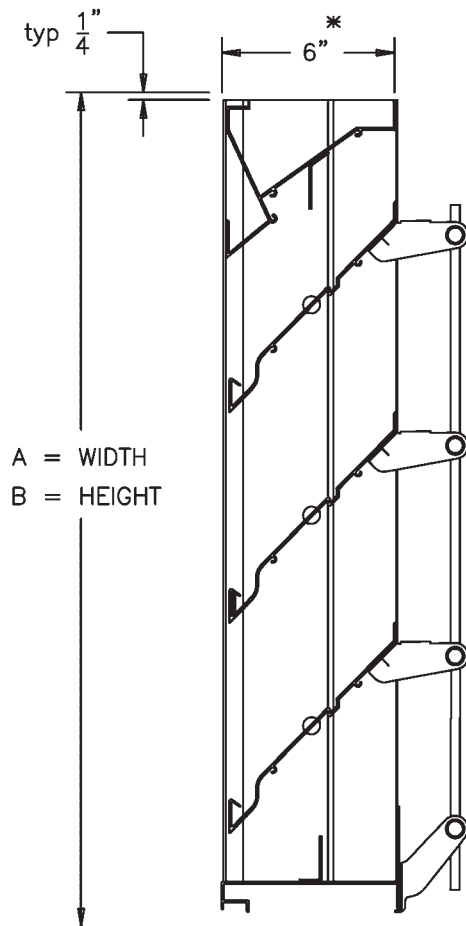


		Free Area sq.ft						
		Width						
Height	12"	0.21	0.36	0.51	0.67	0.82	0.98	1.13
	24"	0.53	0.93	1.33	1.73	2.13	2.53	2.93
	36"	1.02	1.79	2.56	3.32	4.09	4.86	5.62
	48"	1.51	2.65	3.78	4.92	6.05	7.19	8.58
	60"	1.84	3.22	4.60	5.98	7.36	8.74	10.12
	72"	2.33	4.08	5.82	7.57	9.32	11.07	12.81
	84"	2.82	4.93	7.05	9.16	11.28	13.39	15.51
	96"	3.15	5.51	7.87	10.23	12.59	14.95	17.31

air balance

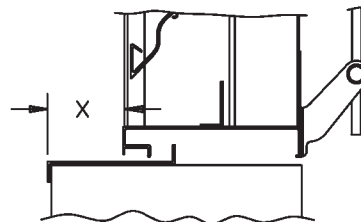
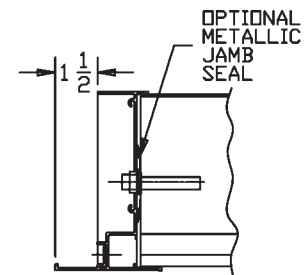
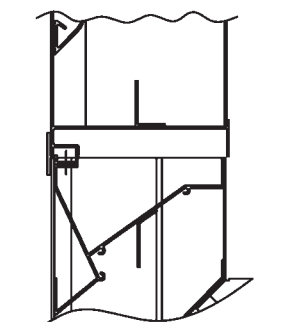
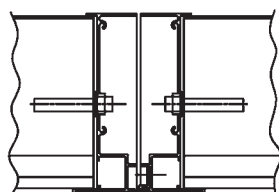
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EXTRUDED ALUMINUM, 6" DEEP, ADJUSTABLE DRAINABLE TYPE BLADE



SECTION VIEW

- MODEL A645A
STANDARD SPECIFICATION
- FRAME: 6" DEEP CHANNEL, .081" THICK 6063-T5 EXTRUDED ALUMINUM ALLOY
- BLADES: .081" THICK 6063-T5 EXTRUDED ALUMINUM ALLOY
- FINISH: MILL
- SCREEN: 1/2" REMOVABLE EXPANDED ALUMINUM BIRD SCREEN LOCATED ON *INTERIOR*
- JAMB SEALS: ROLLFORMED STAINLESS STEEL
- AXLES: 1/2" DIAMETER ALUMINUM
- BEARINGS: POLYMER PLASTIC SPLIT
- LINKAGE: PLATED STEEL BRACKETS, BRASS BARRELS, 5/16" DIA. PLATED STEEL LINKAGE ROD
- ACTUATOR: INDIVIDUAL PANEL WING NUT. SEE ACTUATOR PRICE PAGE FOR OTHER SELECTIONS
- MAXIMUM PANEL SIZE: 48"W X 72"H
- MINIMUM PANEL SIZE: 12"W X 13"H
- DIMENSIONS: "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING SIZES. LOUVERS ARE MADE 1/2" UNDERSIZE

EXTENDED SILL
OPTIONALFLANGED FRAME
OPTIONAL
(JAMB SHOWN)STANDARD HORIZONTAL
MULLIONSTANDARD VERTICAL
MULLION

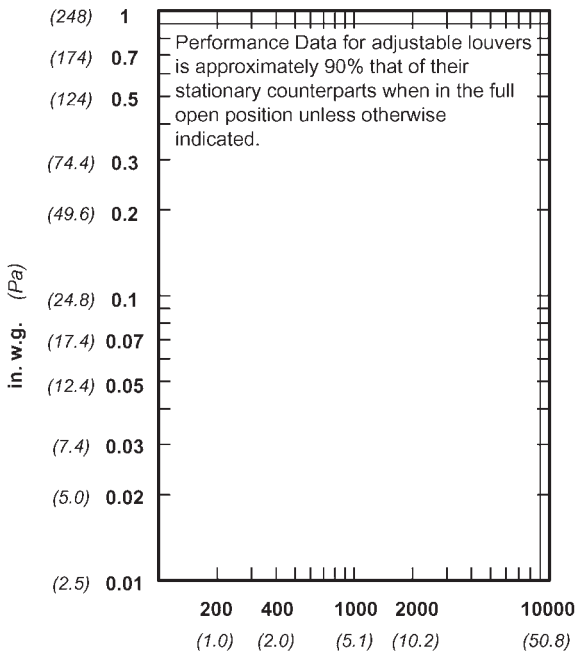
abi air balance
A MESTEK COMPANY
7435 Industrial Rd Florence KY
Phone (859) 538-3400 Fax (859) 647-7810

A645A ADJUSTABLE LOUVER

DRN. BY	ESS	DWG. NO.	REV.
DATE	12-06-07	A645A	

Water Penetration Pressure Drop Free Area : Performance Data for adjustable louvers is approximately 90% that of their stationary counterparts when in the full open position unless otherwise indicated.
: 7.86 sq ft (0.73 sq m) = 49.1% for 48" x 48" (1.22m x 1.22m) test size

INTAKE PRESSURE DROP



VELOCITY THROUGH FREE AREA fpm (m/s)

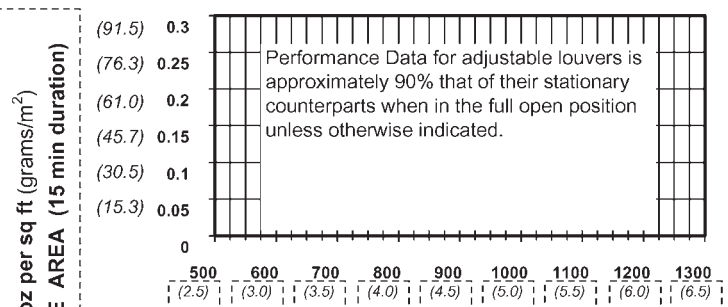
standard air- .075 lbs per cu ft

Ratings do not include the effect of a wire bird screen

FREE AREA IN SQUARE FEET (sq meters)

	WIDTH								
	in. mm	12 305	18 457	24 610	30 762	36 914	42 1067	48 1219	60 1524
HEIGHT	12	0.21	0.35	0.49	0.62	0.76	0.90	1.03	1.31
	305	0.020	0.033	0.046	0.058	0.071	0.084	0.096	0.122
	24	0.56	0.92	1.28	1.64	2.00	2.36	2.73	3.45
	610	0.052	0.085	0.119	0.152	0.186	0.219	0.254	0.321
	36	1.12	1.84	2.56	3.28	4.01	4.73	5.45	6.90
	914	0.104	0.171	0.238	0.305	0.373	0.439	0.506	0.641
	48	1.61	2.65	3.69	4.73	5.77	6.82	7.86	9.94
	1219	0.150	0.246	0.343	0.439	0.536	0.634	0.730	0.923
	60	1.96	3.24	4.51	5.79	7.06	8.34	9.61	12.16
	1524	0.182	0.301	0.419	0.538	0.656	0.775	0.893	1.130
	72	2.52	4.16	5.80	7.43	9.07	10.70	12.34	15.61
	1829	0.234	0.386	0.539	0.690	0.843	0.994	1.146	1.450
	84	3.08	5.08	7.08	9.08	11.07	13.07	15.07	19.07
	2134	0.286	0.472	0.658	0.844	1.028	1.214	1.400	1.772
	96	3.36	5.54	7.72	9.90	12.08	14.26	16.44	20.79
	2438	0.312	0.515	0.717	0.920	1.122	1.325	1.527	1.931

WATER PENETRATION



Leakage:

We have shown two leakage values for the louver sizes below. The upper values with blade seals, and lower values are with optional blade and jamb seals. Values were derived from tests performed in accordance with AMCA 500. Values are in total (CFM) at 1 in wg differential pressure.

		WIDTH					
HEIGHT		SEALS	12	24	36	48	60
	12	BLADE	96	126	156	187	218
		BLD & JMB	36	46	56	66	n/a
	24	BLADE	153	203	253	303	353
		BLD & JMB	66	83	100	117	n/a
	36	BLADE	230	300	370	440	510
		BLD & JMB	99	122	146	169	n/a
	48	BLADE	307	398	488	578	668
		BLD & JMB	131	161	192	222	n/a
	60	BLADE	392	512	632	753	874
		BLD & JMB	177	217	257	297	n/a
	72	BLADE	469	610	750	890	1030
		BLD & JMB	209	256	303	349	n/a
	84	BLADE	554	724	894	1065	1236
BLD & JMB		n/a	n/a	n/a	n/a	n/a	
96	BLADE	631	822	1012	1202	1392	
	BLD & JMB	n/a	n/a	n/a	n/a	n/a	

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height with a single panel. Unusually high wind loading may require maximum panel size to be reduced, check with factory before ordering Structural supports and mounting accessories are not supplied by AVW as a standard.

TOTAL LEAKAGE IN
SCFM @ 1 IN wg DP
CLOSING TORQUE
IN inch/pounds

Operating Force Factor:

Louvers are normally operated by applying a force to the blade to blade linkage whereas dampers are driven through the blade axes. Because of this fact, simple operating torques cannot be published. The factors shown are to be used with the data shown in our louver actuator selection guide found in our louver actuator price list.

		WIDTH					
HEIGHT		SEALS	12	24	36	48	60
	12	BLADE	24	54	84	114	144
		BLD & JMB	57	114	172	229	n/a
	24	BLADE	33	74	114	155	196
		BLD & JMB	79	156	233	310	n/a
	36	BLADE	58	129	201	272	343
		BLD & JMB	144	279	413	548	n/a
	48	BLADE	75	167	260	352	444
		BLD & JMB	188	361	535	709	n/a
	60	BLADE	92	205	319	432	545
		BLD & JMB	231	444	657	869	n/a
	72	BLADE	110	243	377	512	647
		BLD & JMB	275	526	778	1030	n/a
	84	BLADE	127	282	437	591	745
		BLD & JMB	n/a	n/a	n/a	n/a	n/a
	96	BLADE	144	320	495	670	845
BLD & JMB		n/a	n/a	n/a	n/a	n/a	

MODEL A655A

6" Deep • Non- Drainable Blade • Adjustable Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** .080" thick nominal; 6063-T6/T52 extruded aluminum alloy
- BLADES:** .080" thick nominal; 6063-T6/T52 extruded aluminum alloy
- FACE OF LOUVER:** Full width sill and drain head and non-drain blades contained within the drain jambs.
- LINKAGE:** Extruded aluminum, concealed in channel out of airstream. Pivots are .50 dia. machined steel. Cadmium plated and chromate treated. Pivots rotate in a celcon bearing. A .312" dia. Aluminum linkage rod is locked to the pivot by a 1/4 - 20 set screw with epoxy locking patch.
- SHAFT:** .50 DIA. ALUMINUM "Pin-Lock" Rod.
- BLADE SEALS:** Extruded silicone rubber seal at blade edge.
- JAMB SEALS:** Polyurethane
- SCREEN:** 1/2" x .051" flattened aluminum bird screen.
- FINISH:** Mill

OPTIONS

Finish - Baked Powder Polyester, Kynar, or Anodize

Variety of Bird and Insect Screen

1 5/8" Usable Flange Frame

Blank-off Panels

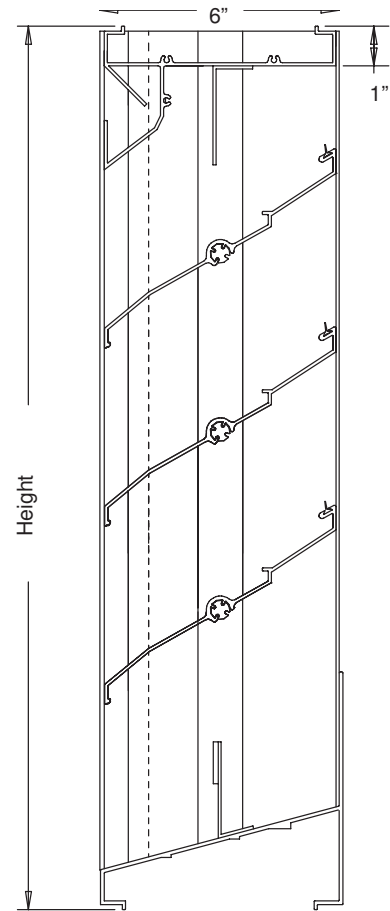
Actuators (Electric, Pneumatic, Manual, etc.)

NOTES

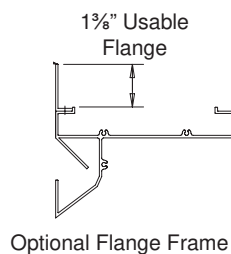
- "A" width and "B" height are opening dimensions. Louver will be provided approximately 1/2" undercut.
- Shipping weight approximately 5.5 lbs./sq.ft.

LOUVER SIZES

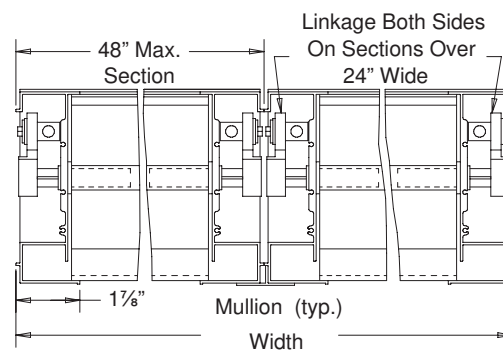
Panels	Min Panel	Max Single Panel
A655A	12"W x 12"H	48"W x 96"H



Section View



Optional Flange Frame



air balance

Dampers  Louvers
UL Life Safety Products
Division of Mestek
Member of AMCA

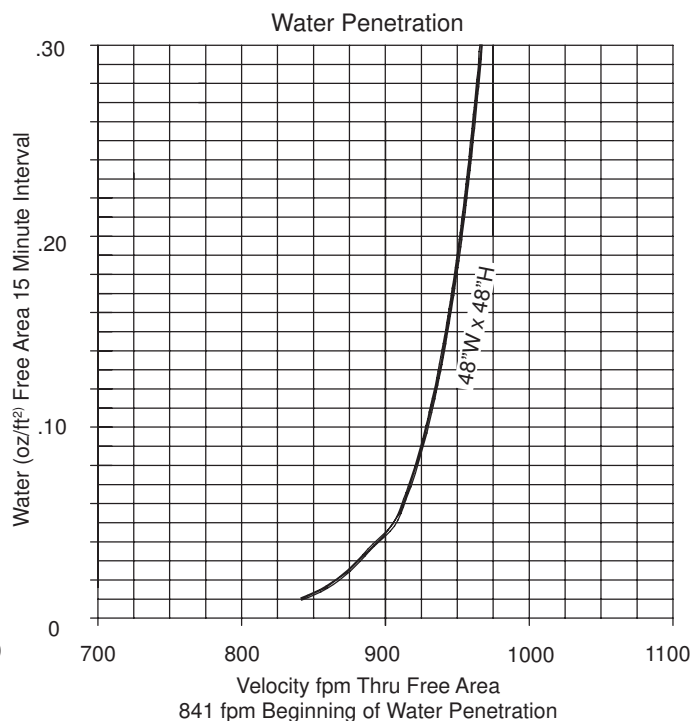
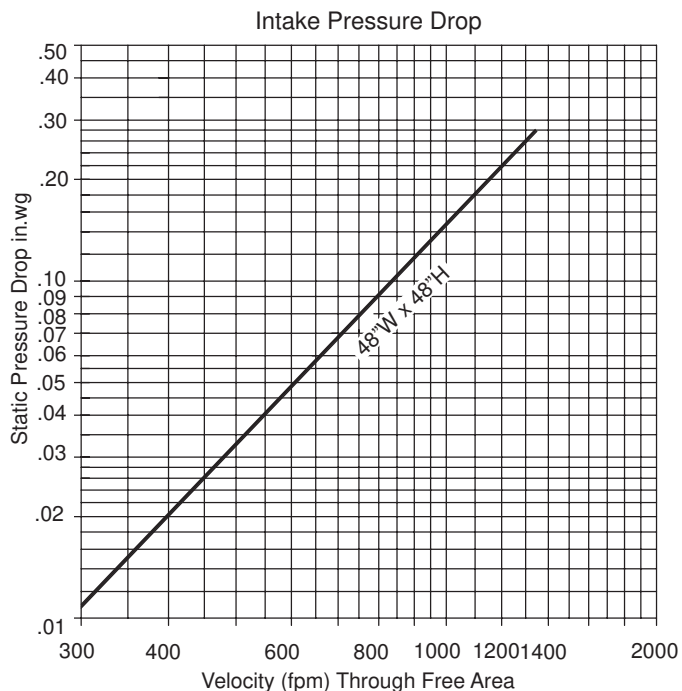
MODEL A655A

6" Deep • Non-Drainable Blade • Adjustable Extruded Aluminum Louver

Water Penetration: 800 fpm recommended maximum free area velocity

Pressure Drop: 0.15 in.wg at 1000 fpm and 7619 scfm

Free Area: 9.06 sq.ft. = 57% for 48"W x 48"H test size



		Free Area sq.ft						
		Width						
Height		12"	18"	24"	30"	36"	42"	48"
	12"	0.21	0.36	0.51	0.67	0.82	0.98	1.13
	24"	0.54	0.94	1.35	1.75	2.15	2.56	2.96
	36"	1.04	1.81	2.59	3.37	4.15	4.92	5.70
	48"	1.53	2.69	3.84	4.99	6.14	7.29	9.06
	60"	1.87	3.27	4.67	6.07	7.47	8.87	10.27
	72"	2.37	4.14	5.91	7.69	9.46	11.23	13.01
	84"	2.86	5.01	7.16	9.31	11.45	13.60	15.75
	96"	3.20	5.59	7.99	10.39	12.78	15.18	17.58

air balance

Dampers  Louvers
 UL Life Safety Products
 Division of Mestek
 Member of AMCA

MODEL A454C

4" Deep • Drainable • Combination Adjustable And Stationary Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .080" thick nominal; 6063-T6/T52 extruded aluminum alloy

BLADES: Stationary blade .080" thick nominal ; 6063-T6/T52

extruded aluminum alloy

Adjustable blade .125" thick nominal; 6063-T6/T52

extruded aluminum alloy

FACE OF LOUVER: Full width sill with drain head with blades contained within the jambs

LINKAGE: Extruded aluminum, concealed in channel out of airstream. Pivots are .50 dia. machined steel. Cadmium plated and chromate treated. Pivots rotate in a celcon bearing. A .312" dia. Aluminum linkage rod is locked to the pivot by a 1/4 - 20 set screw with epoxy locking patch.

SHAFT: .50 dia. aluminum "Pin-Lock" Rod

BLADE SEALS: Extruded silicone rubber seal at blade edge.

JAMB SEALS: Stainless steel jamb seals

SCREEN: 1/2" x .051" flattened aluminum bird screen

FINISH: Mill

OPTIONS

Finish - Baked Powder Polyester , Kynar, or Anodize

Variety of Bird and Insect Screen

1 3/8" Usable Flange Frame (Front Face Only)

Blank-off Panels

Actuators (Electric, Pneumatic, Manual, etc.)

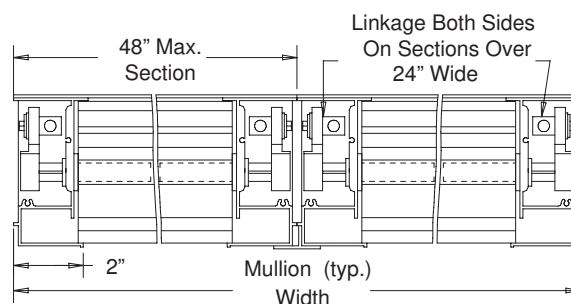
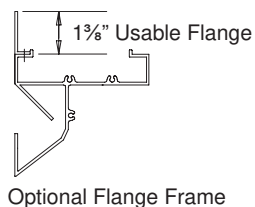
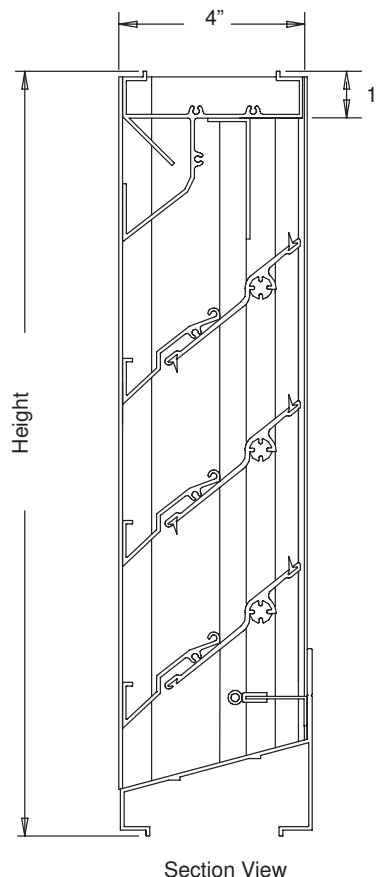
NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.

2. Shipping weight approximately 5.5 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A454C	12"W x 12"H	48"W x 96"H



air balance

Dampers  Louvers
UL Life Safety Products
Division of Mestek
Member of AMCA

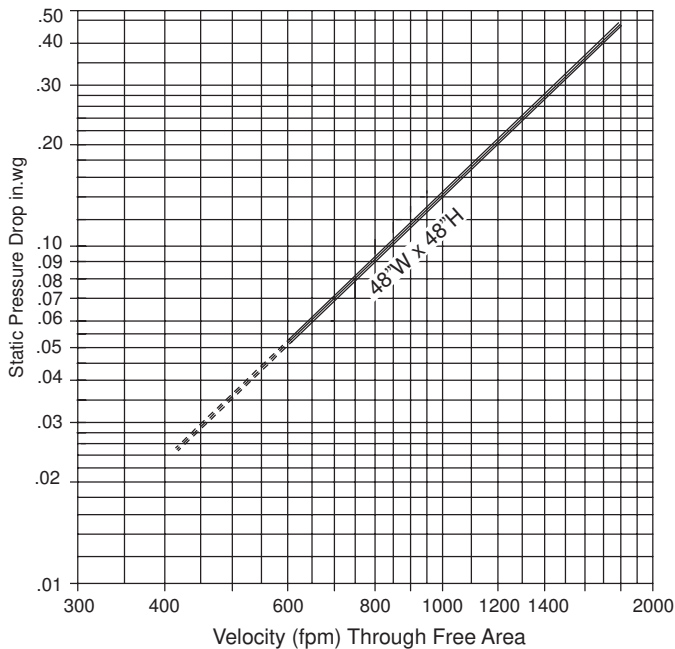
MODEL A454C

4" Deep • Drainable • Combination Adjustable And Stationary Louver

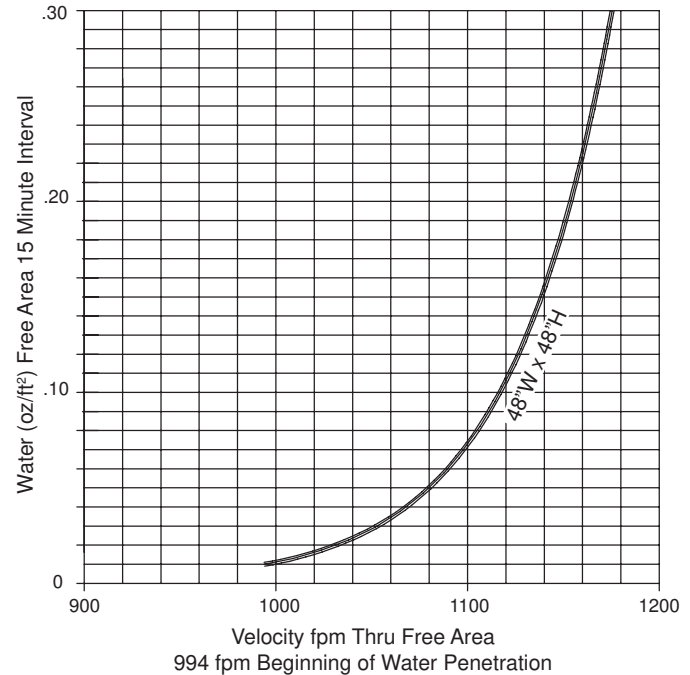
Water Penetration: At 900 fpm recommended maximum free area velocity
 Pressure Drop: 0.14 in.wg at 1000 fpm and 8360 scfm
 Free Area: 8.36 sq.ft. = 52% for 48"W x 48"H test size

Ratings do not include effects of birdscreen

Intake Pressure Drop



Water Penetration

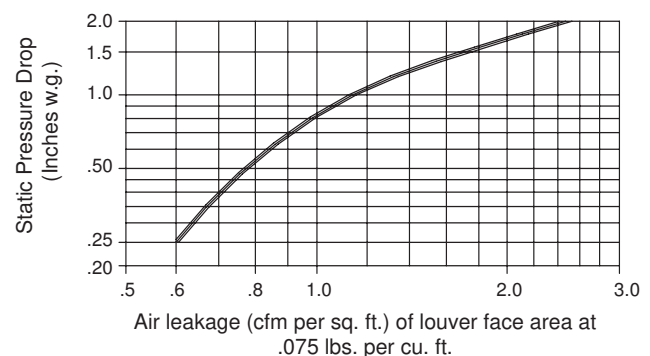


Free Area sq.ft

		Width						
		12"	18"	24"	30"	36"	42"	48"
Height	12"	0.18	0.32	0.46	0.60	0.74	0.88	1.02
	24"	0.59	1.03	1.48	1.92	2.36	2.81	3.25
	36"	1.00	1.75	2.49	3.24	3.99	4.74	5.49
	48"	1.52	2.67	3.81	4.95	6.09	7.23	8.36
	60"	1.90	3.32	4.74	6.16	7.58	9.00	10.42
	72"	2.39	4.19	5.98	7.78	9.57	11.37	13.16
	84"	2.79	4.89	6.98	9.08	11.17	13.27	15.36
	96"	3.26	5.71	8.16	10.61	13.05	15.50	17.95

Air leakage (louver installation position, intake) is per AMCA Standard 500 Procedure Fig. 5.5.

Air Leakage with adjustable blade in closed position with a seating torque of 6.25 in. lb. // sq. ft. of louver face area. Leakage is based on a test of a 48" x 48" louver.



Air Balance certifies that the Model A454C Louver shown herein is licensed to bear the AMCA seal. The rating shown are based on test and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified rating program. The AMCA Certified Rating Seal applies to Air Performance Ratings and Water Penetration Rating.

MODEL A455I/A455E

4" Deep • Non-Drainable Blade • Combination Intake/Exhaust • Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** .081" thick; 6063-T6/T52 extruded aluminum alloy**BLADES:** Stationary - .081" thick; 6063-T6/T52 extruded aluminum alloy; Operable - .050" thick; 6063-T6/T52 extruded aluminum alloy**SHAFT:** .50 dia. aluminum Pin-Lock rod**ASSEMBLY:** Mechanically fastened**SCREEN:** ½" x .051" attened aluminum birscreen**FINISH:** Mill**OPTIONS**

Finish - Baked Enamel, Kynar, or Anodize

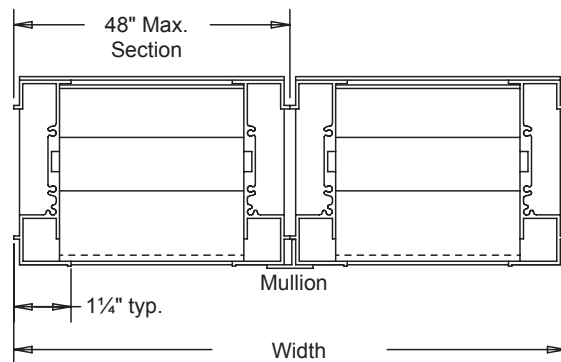
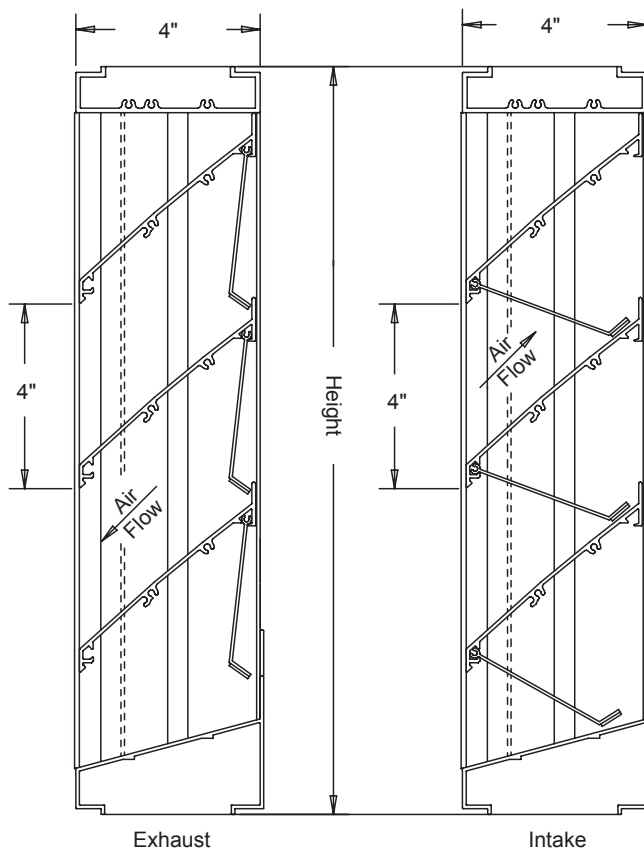
Variety of Bird and Insect Screen

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undersize.
2. Inter-connecting linkage and counterweights not available.
3. Specify intake or exhaust when ordering
4. Shipping weight approximately 5.6 lbs./sq.ft.

LOUVER SIZES

Panels	Minimum Panel	Maximum Panel
A455I A455E	12"W x 12"H	48"W x 96"H



air balance

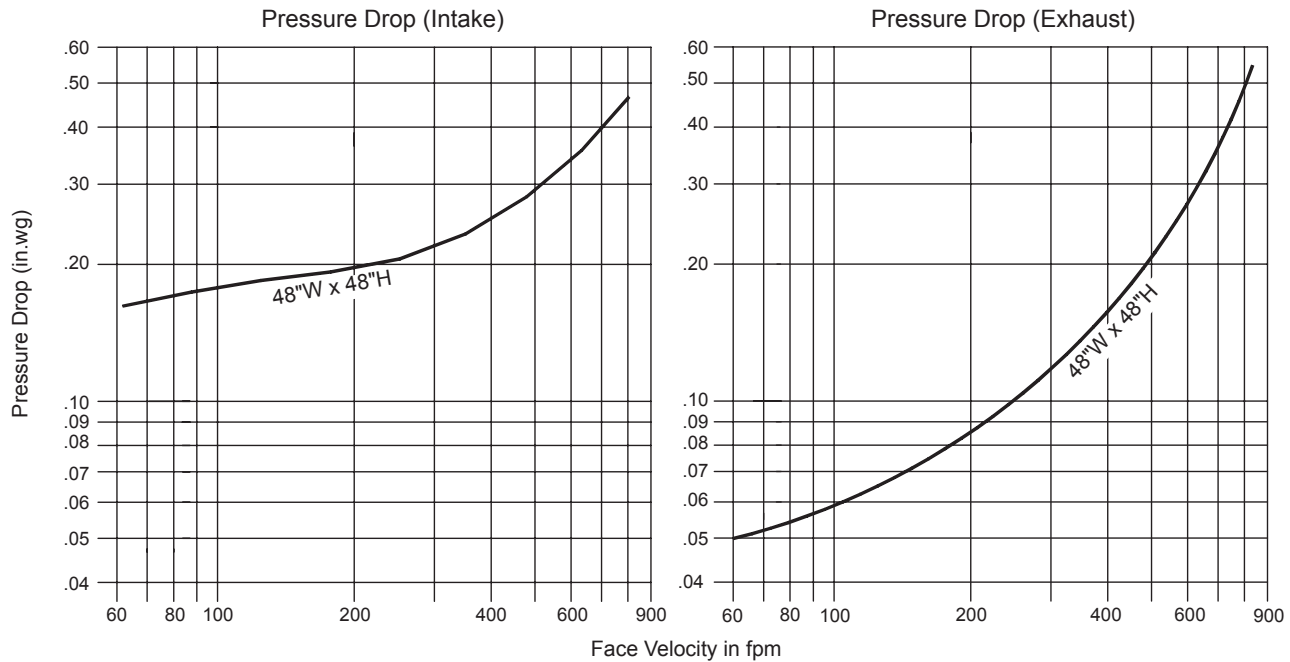
Dampers  Louvers
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MODEL A455I/A455E

4" Deep • Non-Drainable Blade • Combination Intake/Exhaust • Extruded Aluminum Louver

Pressure Drop Rating:

Louver installed per AMCA 500 Fig. 5.4 (face mounted to a plenum) pressure is corrected to .075 lb./cu.ft. air density.



Typical performance for model A455I/A455E combination louver, without the use of blade linkage, counterweights, and screens.

MODEL A635AF

6" Deep • Combination Adjustable Airfoil and Stationary Drainable Louver

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** .080 thick; 6063-T6/T52 extruded aluminum alloy
- STATIONARY BLADES:** .080 thick; 6063-T6/T52 extruded aluminum alloy on 4 1/2" centers
- ADJUSTABLE BLADES:** .125" thick; 6063-T6/T52 extruded aluminum alloy
- FACE OF LOUVER:** Full head and sill with blade and jambs contained within
- LINKAGE:** Extruded aluminum, concealed in channel out of airstream. Pivots are 1/2" dia. machined steel, cadmium plated and chromate treated. Pivots rotate in a celcon bearing. A .312" dia. aluminum linkage rod is locked to the pivot by a 1/4"-20 set screw with an epoxy locking patch
- SHAFTS:** 1/2" dia. aluminum "pin-lock" rod
- BLADE SEALS:** Extruded silicone rubber seal
- JAMB SEALS:** Stainless steel
- SCREEN:** Bird screen 1/2" flattened aluminum, .051" thick
- FINISH:** Mill on galvanized steel

OPTIONS

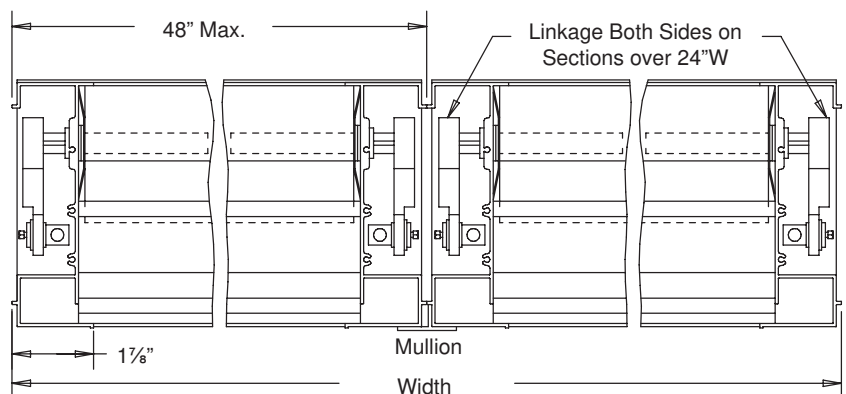
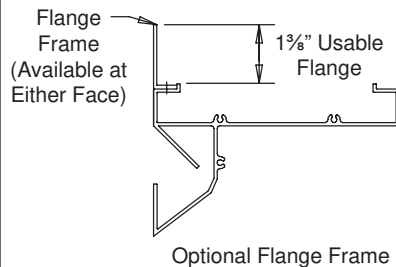
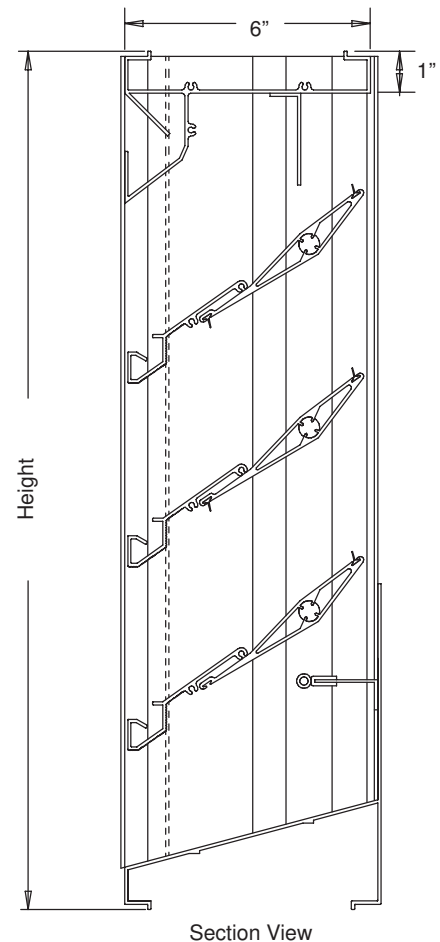
Flange Frame
 Bird Screen in a Removable Frame
 Variety of Bird and Insect Screens
 Finishes - Baked Enamel, Kynar, Anodize
 Actuators - Electric, Pneumatic, Manual

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided 1/2" undersize.

LOUVER SIZES

Orientation	Horizontal & Vertical	
Panel	Minimum Panel	Maximum Single Panel
Rectangular	12"W x 12"H	48"W x 96"H



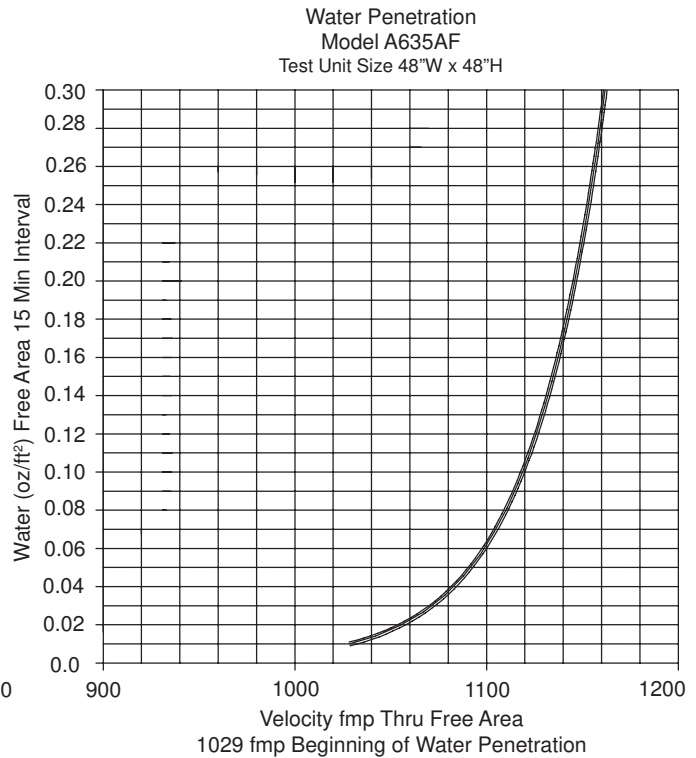
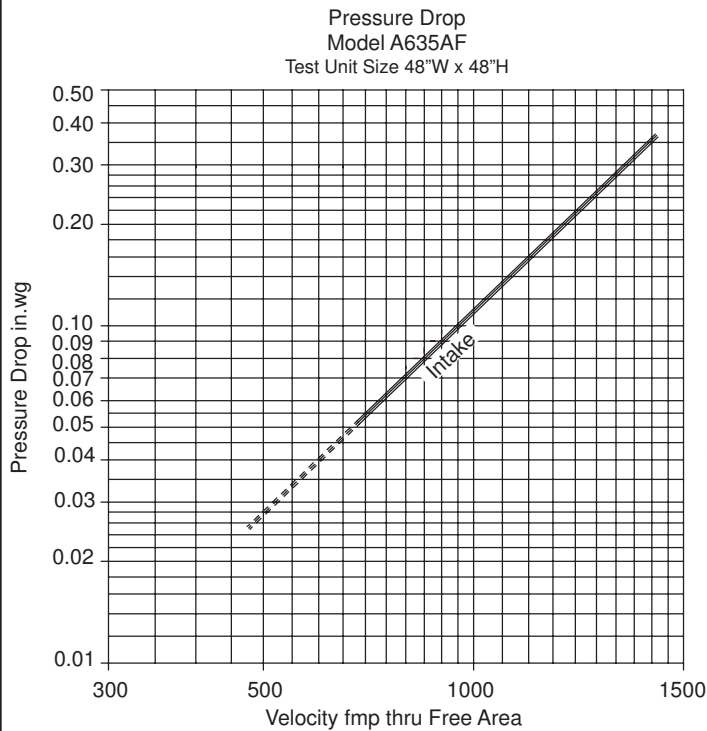
MODEL A635AF

6" Deep • Combination Adjustable Airfoil and Stationary Drainable Louver

Water Penetration: 0.01oz at 1026 fpm recommended free area velocity

Pressure Drop: 0.14 in.wg at 1026 fpm and 8465 SCFM

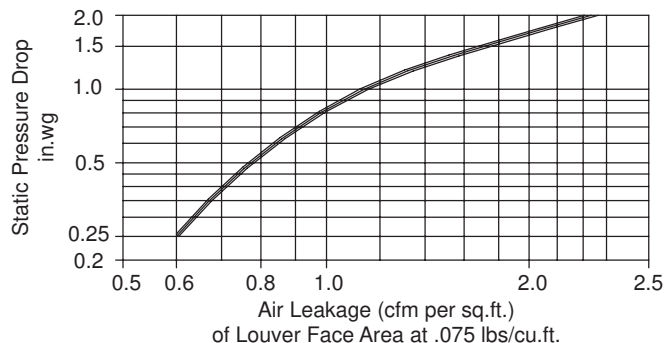
Free Area: 8.25 sq.ft = 52% for 48"W x 48"H test size



		Free Area sq.ft						
		Width						
Height		12	18	24	30	36	42	48
	12	.14	.24	.34	.45	.55	.65	.76
	24	.64	1.12	1.6	2.08	2.55	3.03	3.51
	36	1.00	1.76	2.51	3.26	4.02	4.77	5.52
	48	1.50	2.62	3.75	4.87	5.99	7.11	8.24
	60	2.00	3.50	4.99	6.49	7.99	9.49	10.99
	72	2.36	4.14	5.91	7.67	9.45	11.23	13.00
	84	2.86	5.00	7.14	9.29	11.42	13.59	15.71
	96	3.36	5.87	8.39	10.91	13.43	15.94	18.46

Air Leakage (louver installation position, intake) is per AMCA Standard 500 Procedure Fig. 5.5.

Air leakage with adjustable blade in closed position with a seating torque of 6.25 in.lb/sq.ft. of louver face area. Leakage is based on a test of a 48"W x 48"H louver.



MODEL A665C

6" Deep • Drainable • Combination Adjustable And Stationary Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .080" thick nominal; 6063-T6/T52 extruded aluminum alloy

BLADES: Stationary blade .080" thick nominal ; 6063-T6/T52 extruded aluminum alloy.

Adjustable blade .125" thick nominal; 6063-T6/T52 extruded aluminum alloy.

FACE OF LOUVER: Full width sill with head and blades contained within the jambs.

LINKAGE: Extruded aluminum, concealed in channel out of airstream. Pivots are .50 dia. machined steel. Cadmium plated and chromate treated. Pivots rotate in a celcon bearing. A .312" dia. Aluminum linkage rod is locked to the pivot by a 1/4 - 20 set screw with epoxy locking patch.

.50 dia. aluminum "Pin-Lock" Rod.

BLADE SEALS: Extruded silicone rubber seal at blade edge.

JAMB SEALS: Stainless steel jamb seals.

SCREEN: 1/2" x .051" flattened aluminum bird screen

FINISH: Mill

OPTIONS

Finish - Baked Powder Polyester , Kynar, or Anodize

Variety of Bird and Insect Screen

1 3/8" Usable Flange Frame

Blank-off Panels

Actuators (Electric, Pneumatic, Manual, etc.)

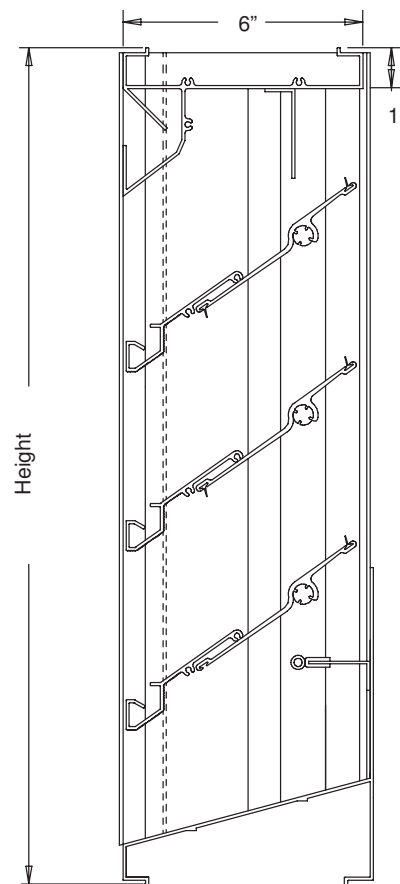
NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.

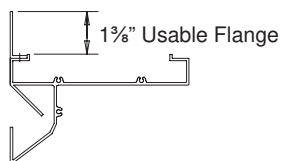
2. Shipping weight approximately 5.7 lbs./sq.ft.

LOUVER SIZES

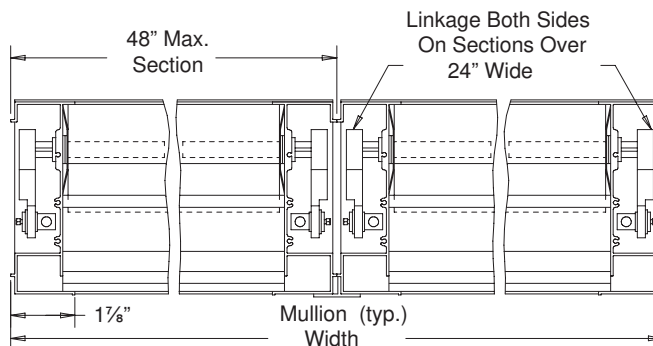
Panels	Min Panel	Max Single Panel
A665C	12"W x 12	48"W x 96"H



Section View



Optional Flange Frame



air balance

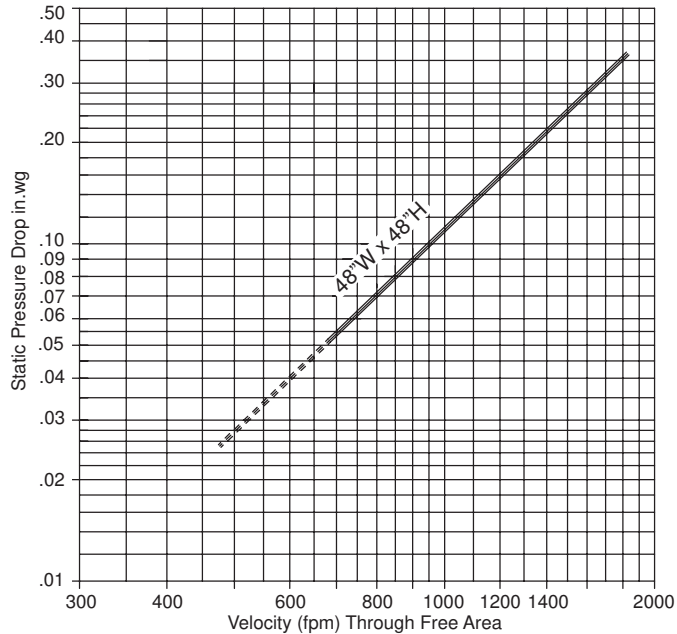
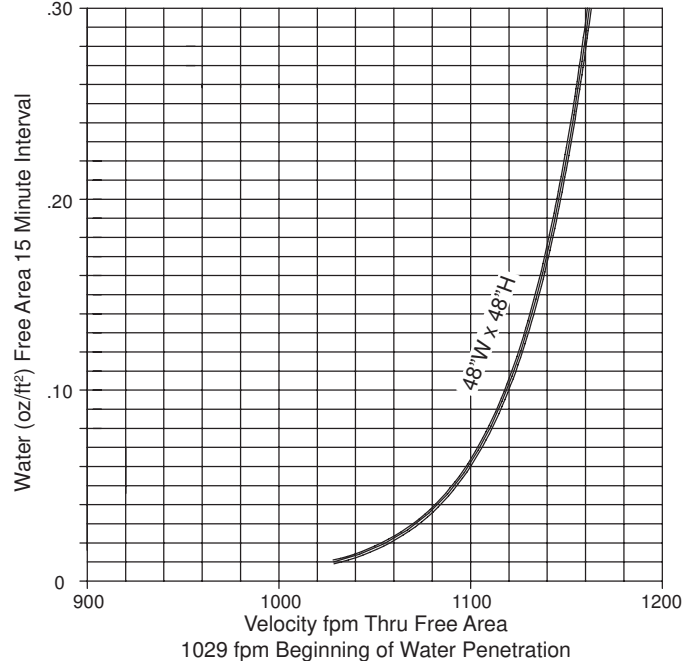
Dampers  Louvers
UL Life Safety Products
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Member of AMCA

MODEL A665C

6" Deep • Drainable • Combination Adjustable And Stationary Extruded Aluminum Louver

Water Penetration: 1000 fpm recommended maximum free area velocity
 Pressure Drop: 0.12 in.wg at 1050 fpm and 8652 scfm
 Free Area: 8.24 sq.ft. = 52% for 48"W x 48"H test size

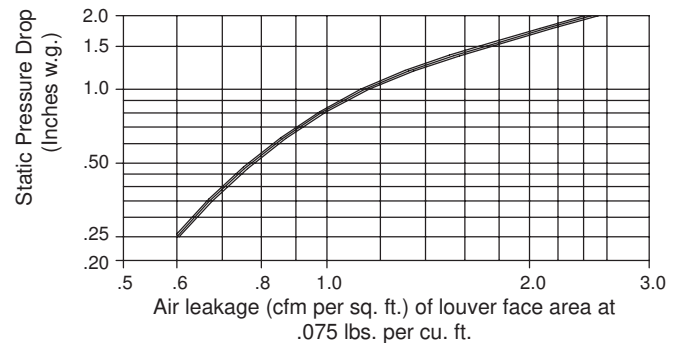
Ratings do not include effects of birdscreen

Intake Pressure Drop**Water Penetration****Free Area sq.ft.**

		Width						
		12"	18"	24"	30"	36"	42"	48"
Height	12"	0.14	0.24	0.34	0.45	0.55	0.65	0.76
	24"	0.64	1.12	1.60	2.08	2.55	3.05	3.51
	36"	1.00	1.76	2.51	3.26	4.02	4.77	5.52
	48"	1.50	2.62	3.74	4.87	5.99	7.11	8.24
	60"	2.00	3.50	4.99	6.49	7.99	9.49	10.99
	72"	2.36	4.14	5.91	7.68	9.45	11.23	13.00
	84"	2.86	5.00	7.14	9.28	11.42	13.57	15.71
	96"	3.36	5.87	8.39	10.91	13.43	15.94	18.46

Air leakage (louver installation position, intake) is per AMCA Standard 500 Procedure Fig. 5.5.

Air Leakage with adjustable blade in closed position with a seating torque of 6.25 in.lb. / sq.ft. of louver face area. Leakage is based on a test of a 48" x 48" louver.



Air Balance certifies that the Model A668C Louver shown herein is licensed to bear the AMCA seal. The rating shown are based on test and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified rating program. The AMCA Certified Ratings Seal applies to Air Performance Ratings and Water Penetration Ratings.

MODEL A681C

6" Deep • Non-Drainable • Combination Adjustable And Stationary Extruded Aluminum Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .080" thick nominal; 6063-T6/T52 extruded aluminum alloy

BLADES: Stationary blade .080" thick nominal ; 6063-T6/T52 extruded aluminum alloy
Adjustable blade .125" thick nominal; 6063-T6/T52 extruded aluminum alloy

FACE OF LOUVER: Full width sill with head and blades contained within the jambs

LINKAGE: Extruded aluminum, concealed in channel out of airstream. Pivots are .50 dia. machined steel. Cadmium plated and chromate treated. Pivots rotate in a celcon bearing. A .312" dia. Aluminum linkage rod is locked to the pivot by a 1/4 - 20 set screw with epoxy locking patch.

SHAFT: .50 dia. aluminum "Pin-Lock" Rod

BLADE SEALS: Extruded silicone rubber seal at blade edge.

JAMB SEALS: Stainless steel jamb seals

SCREEN: 1/2" x .051" flattened aluminum bird screen

FINISH: Mill

OPTIONS

Finish - Baked Powder Polyester , Kynar, or Anodize

Variety of Bird and Insect Screen

1 3/8" Usable Flange Frame (Either Face)

Blank-off Panels

Actuators (Electric, Pneumatic, Manual, etc.)

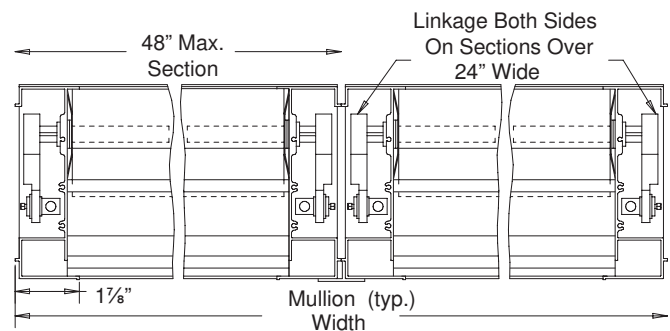
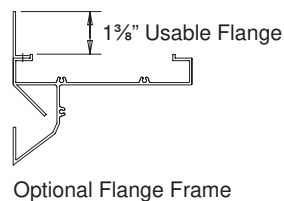
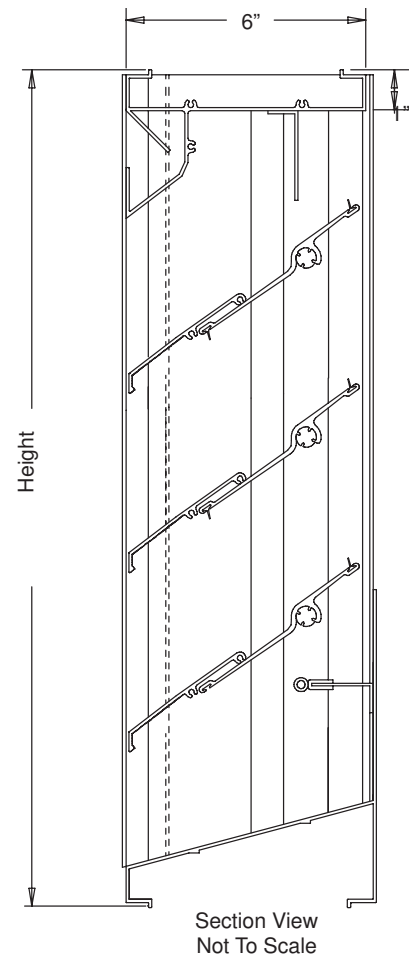
NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.

2. Shipping weight approximately 5.7 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
A681C	12"W x 16H	48"W x 96"H



air balance

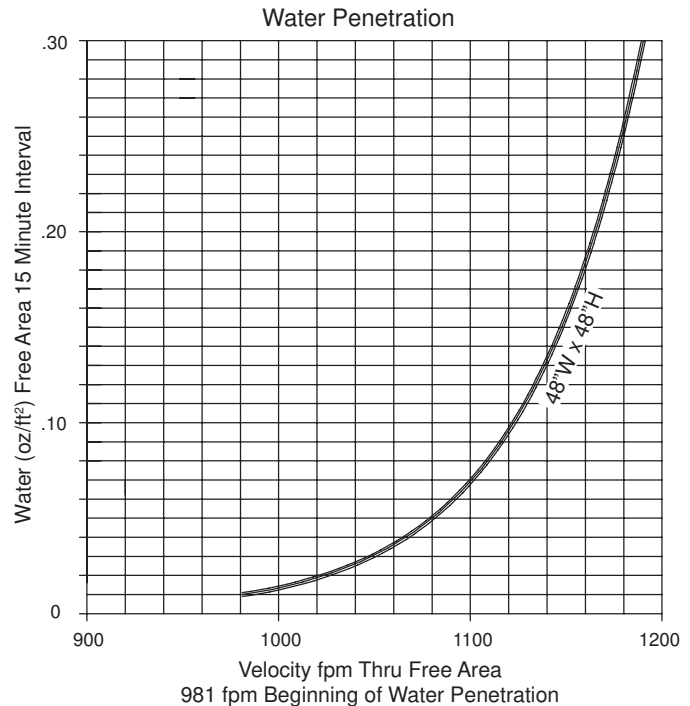
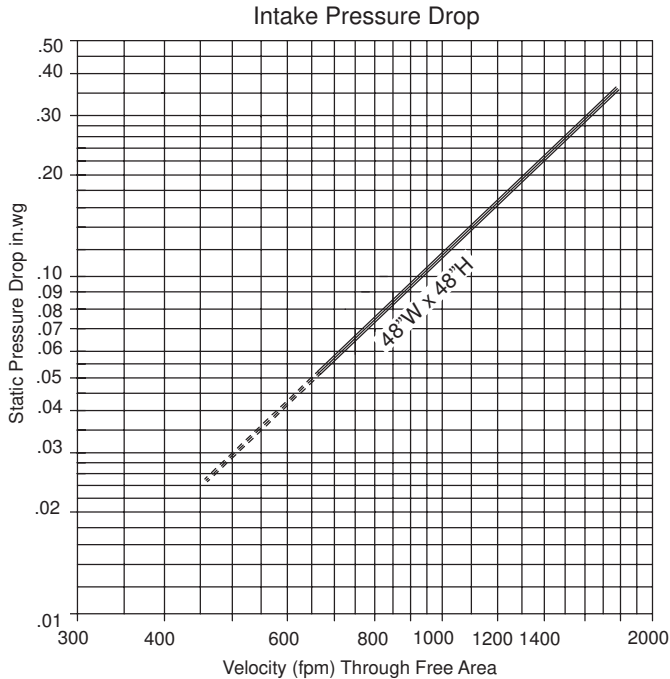
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MODEL A681C

6" Deep • Non-Drainable • Combination Adjustable And Stationary Extruded Aluminum Louver

Water Penetration: 900 fpm recommended maximum free area velocity
 Pressure Drop: 0.12 in.wg at 981 fpm and 8221 scfm
 Free Area: 8.38 sq.ft. = 52% for 48"W x 48"H test size

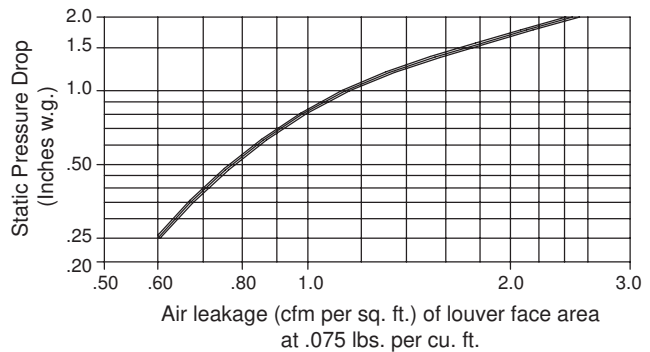
Ratings do not include effects of birdscreen



		Free Area sq.ft.						
		Width						
Height		12"	18"	24"	30"	36"	42"	48"
	12"	0.14	0.24	0.34	0.45	0.56	0.65	0.76
	24"	0.66	1.15	1.65	2.14	2.64	3.13	3.63
	36"	1.04	1.82	2.60	3.38	4.16	4.94	5.71
	48"	1.55	2.72	3.88	5.04	6.12	7.37	8.38
	60"	2.07	3.63	5.18	6.74	8.29	9.85	11.40
	72"	2.45	4.29	6.13	7.97	9.81	11.65	13.49
	84"	2.97	5.19	7.42	9.64	11.87	14.09	16.31
	96"	3.49	6.10	8.72	11.34	13.95	16.57	19.18

Air leakage (louver installation position, intake) is per AMCA Standard 500 Procedure Fig. 5.5.

Air Leakage with adjustable blade in closed position with a seating torque of 6.25 in. lb. // sq. ft. of louver face area. Leakage is based on a test of a 48" x 48" louver.



Air Balance certifies that the Model A681C Louver shown herein is licensed to bear the AMCA seal. The rating shown are based on test and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified rating program. The AMCA Certified Ratings Seal applies to Air Performance Ratings and Water Penetration Ratings.

MODEL AIS4

4" Deep • Extruded Aluminum Louvers Inverted Equipment Screen

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick, 6063-T52/T6 extruded aluminum alloy

BLADE: .081" thick, 6063-T52/T6 extruded aluminum alloy

BLADE SPACING: 4"

FINISH: Mill

SCREEN: None

OPTIONS

.125 Blades

Mitered Corners

Post Corners

Cap Covers

Hinged Access

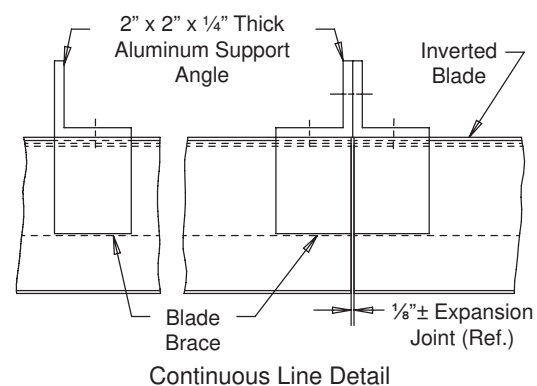
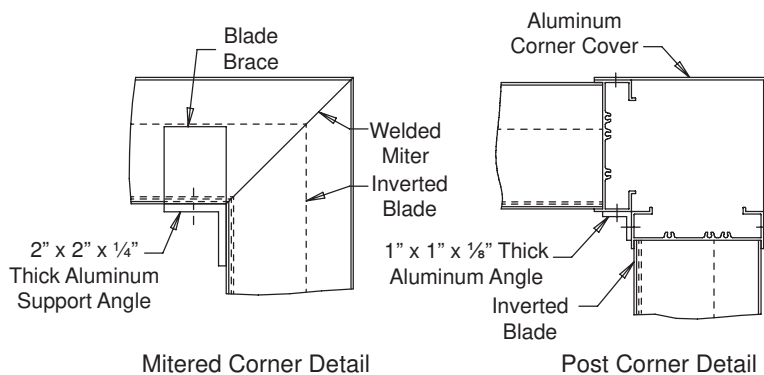
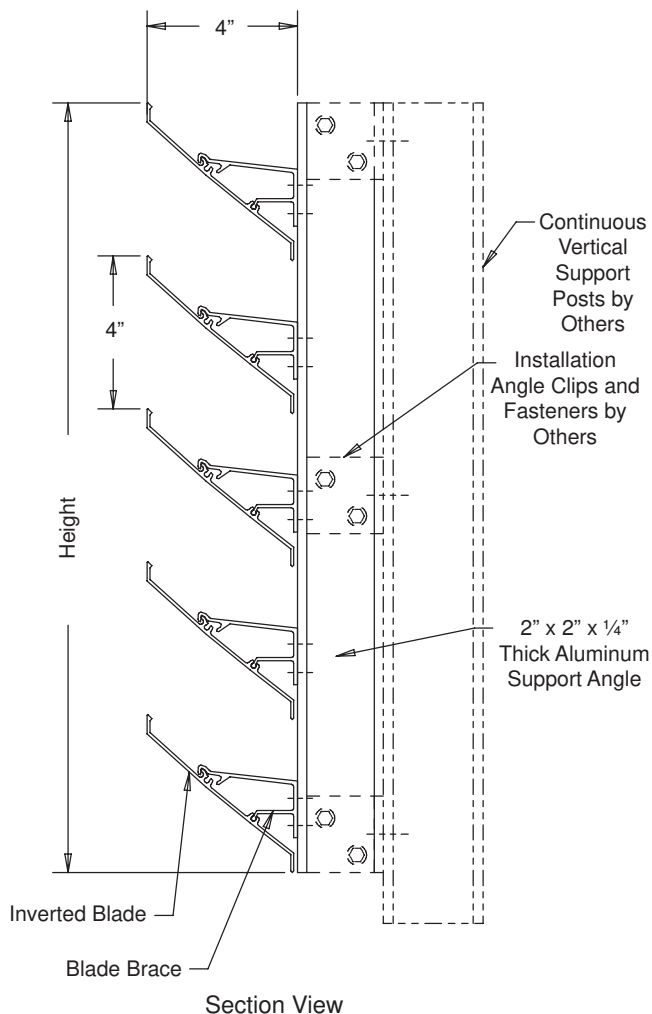
Finishes - Baked Enamel, Kynar, Anodize

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately $\frac{1}{2}$ " undercut.
2. The supports shall incorporate blade support to withstand windload of 20 psf, approximately 90 mph wind. An extruded aluminum 2" x 2" x $\frac{1}{4}$ " thick angle on 60" centers is standard. Supports vary as required per wind load. Consult the factory.
3. Approximate louver weight is 4.5 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
AIS4	12"W x 12"H	60 sq.ft 120"W 72"H



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MODEL AIS4

4" Deep • Extruded Aluminum Louvers Inverted Equipment Screen

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MODEL ASV

Equipment Screen • Extruded Aluminum Louvers

STANDARD MATERIALS AND CONSTRUCTION

SUPPORTS: Shall incorporate rear angle 2" x 2" x 1/4" extruded aluminum to withstand windload of 20 psf, approximately 90 mph wind; spaced on 60" centers

BLADES: .081" thick; 6063-T6/T52 extruded aluminum alloy

BLADE SPACING: 3"

FINISH: Mill

OPTIONS

Finish - Baked Enamel, Kynar, Anodize

Mitered or Post Corner

Hinged Access

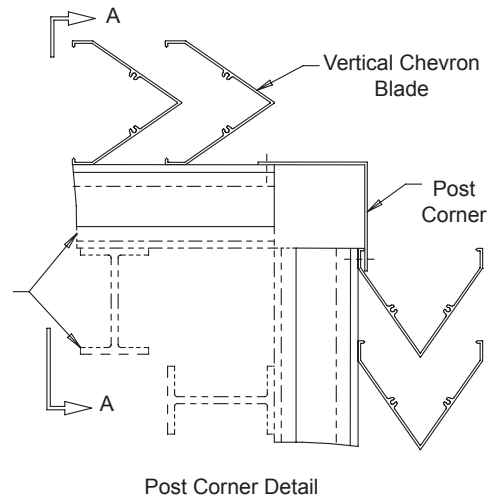
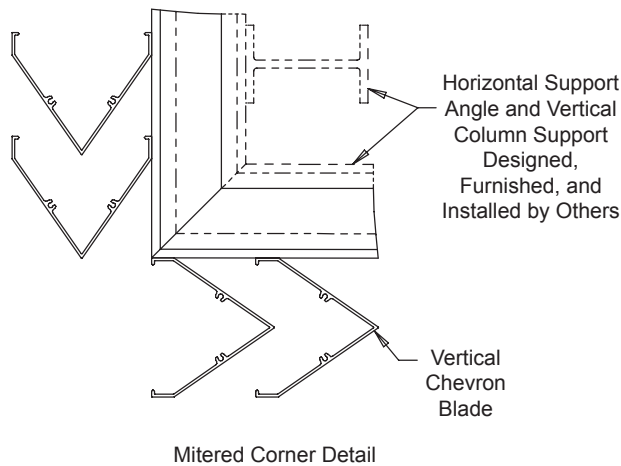
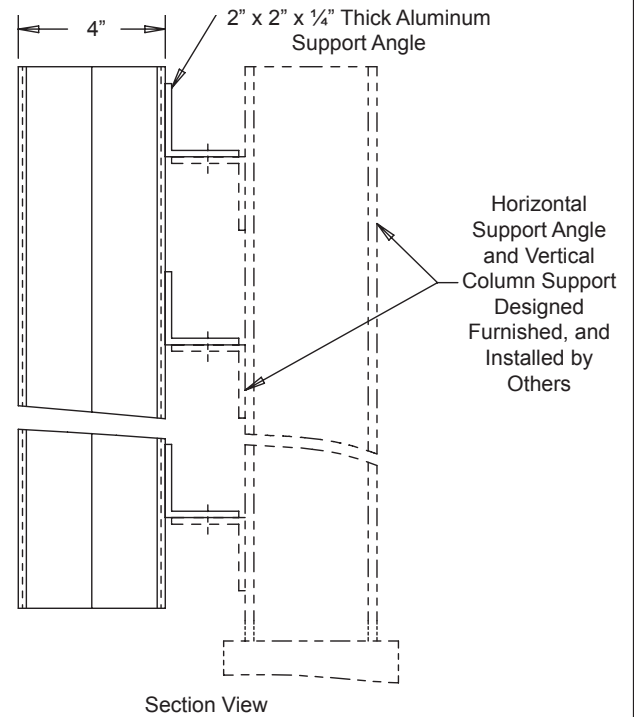
Cap Covers

NOTES

1. Shipping weight approximately 5 lbs./sq.ft.

SCREEN SIZES

Panels	Min Panel	Max Single Panel
ASV	12"W x 12"H	60"W x 96"H 40 sq.ft.



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MODEL ASV

Equipment Screen • Extruded Aluminum Louvers

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MODEL ASY

Equipment Screen • Extruded Aluminum Grille Screen

STANDARD MATERIALS AND CONSTRUCTION

SUPPORTS: Shall incorporate rear angle 2" x 2" x 1/4" extruded aluminum to withstand windload of 20 psf, approximately 90 mph wind; spaced on 60" centers

BLADES: .081" thick; 6063-T6/T52 extruded aluminum alloy

BLADE SPACING: 3"

FINISH: Mill

OPTIONS

Finish - Baked Enamel, Kynar, Anodize

Mitered or Post Corner

Hinged Access

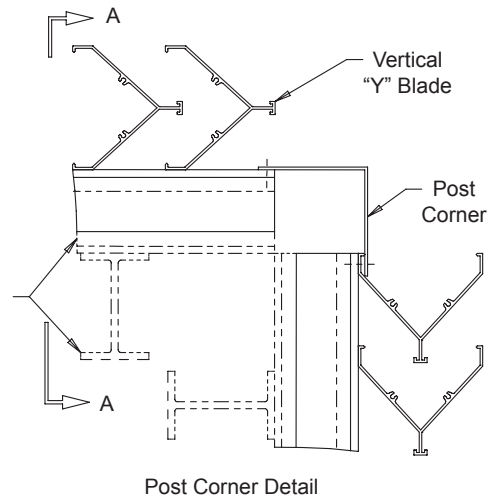
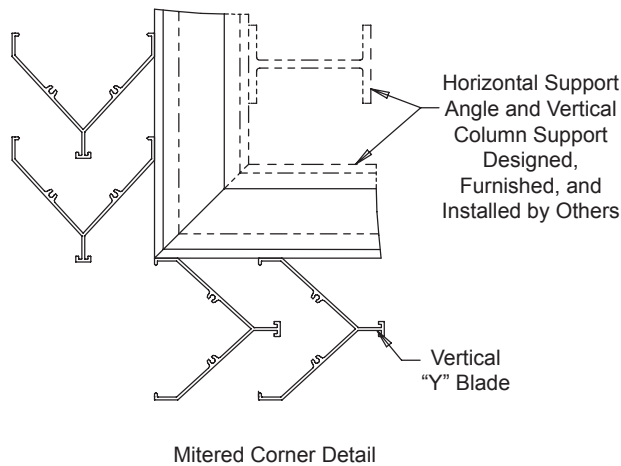
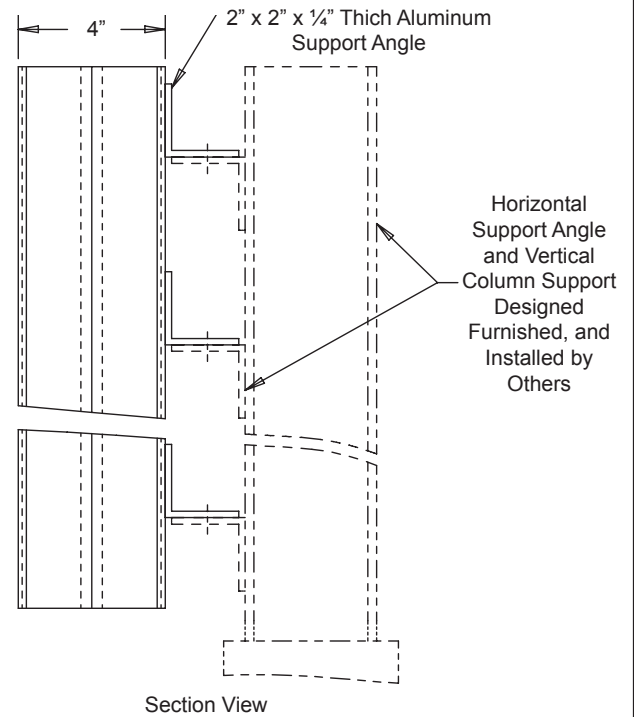
Cap Covers

NOTES

1. Shipping weight approximately 4.5 lbs./sq.ft.

SCREEN SIZES

Panels	Min Panel	Max Single Panel
ASY	12"W x 12"H	60"W x 96"H 40 sq.ft.



air balance

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MODEL ASY

Equipment Screen • Extruded Aluminum Grille Screen

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MODEL GS1

Modular • Extruded Aluminum Grille Screen

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .125" thick; 6063-T6/T52 extruded aluminum alloy
BLADES: .125" thick; 6063-T6/T52 extruded aluminum alloy
BLADE SPACING: 2" - 12" vertical and horizontal
ASSEMBLY: Welded
FINISH: Mill

OPTIONS

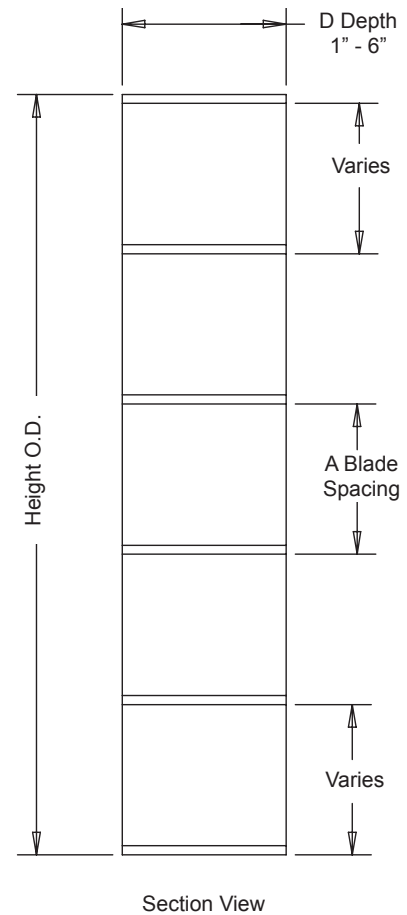
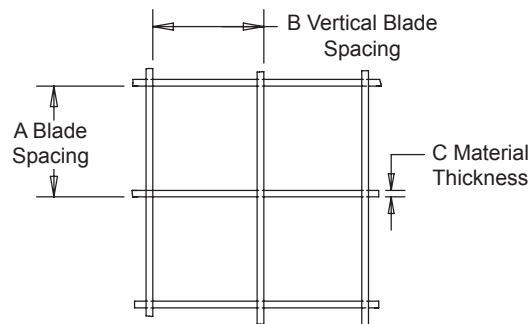
.125" - .250" Nominal Thickness (Frame and/or Blade)
 Grille Depth 1" - 6"

NOTES

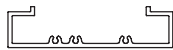
1. A = 2" - 12" Horizontal Blade Spacing
 B = 2" - 12" Vertical Blade Spacing
 C = .125" - .250" Material Thickness
 D = 2" - 6" Grille Depth

GRILLE SCREEN SIZES

Panels	Min Panel	Max Single Panel
GS1	12"W x 12"H	60"W x 96"H 40 sq.ft.



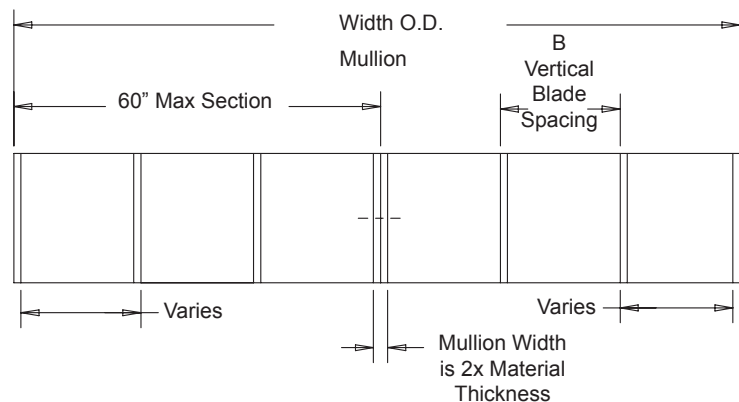
Channel Frame



Angle Frame



Optional Frames



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MODEL GS1

Modular • Extruded Aluminum Grille Screen

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MODEL GS2

Angular Horizontal Bar • Extruded Aluminum Grille Screen

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .125" thick; 6063-T6/T52 extruded aluminum alloy
BLADES: .125" thick; 6063-T6/T52 extruded aluminum alloy
BLADE SPACING: 2" - 12" vertical and horizontal
ASSEMBLY: Welded
FINISH: Mill

OPTIONS

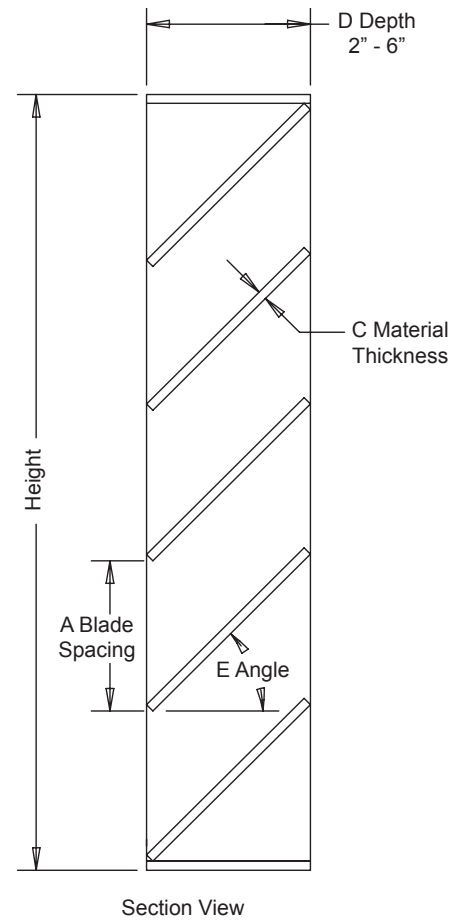
.125" - .250" Nominal Thickness (Frame and/or Blade)
 Blade Angel from 0° - 45°
 Grille Depth 2" - 6"

NOTES

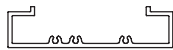
1. A = 2" - 12" Horizontal Blade Spacing
 B = 2" - 12" Vertical Blade Spacing
 C = .125" - .250" Material Thickness
 D = 2" - 6" Grille Depth
 E = 0° - 45° Blade Angle

GRILLE SCREEN SIZES

Panels	Min Panel	Max Single Panel
GS2	12"W x 12"H	60"W x 96"H 40 sq.ft.



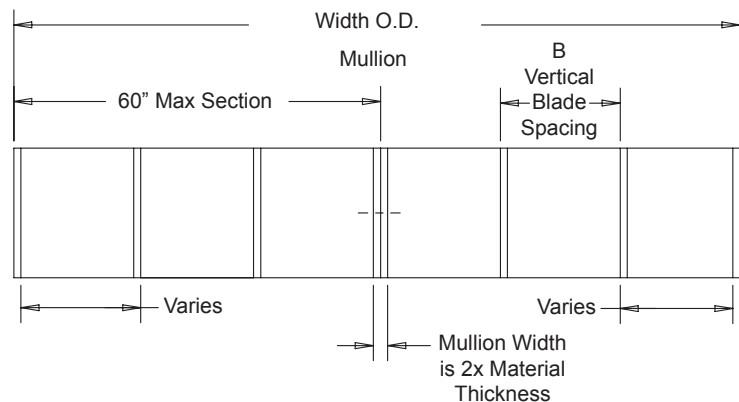
Channel Frame



Angle Frame



Optional Frames



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MODEL GS2

Angular Horizontal Bar • Extruded Aluminum Grille Screen

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MODEL GS2C

Angular Continuous Line • Extruded Aluminum Grille Screen

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .125" thick; 6063-T6/T52 extruded aluminum alloy
BLADES: .125" thick; 6063-T6/T52 extruded aluminum alloy
BLADE SPACING: 2" - 12" vertical and horizontal
ASSEMBLY: Welded
FINISH: Mill

OPTIONS

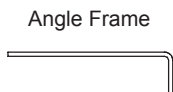
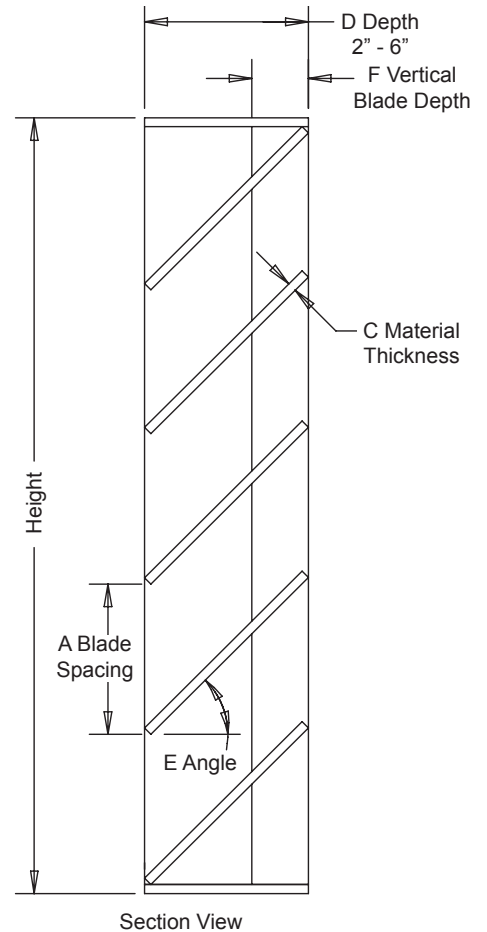
.125" - .250" Nominal Thickness (Frame and/or Blade)
 Blade Angle from 0° - 45°
 Grille Depth 2" - 6"

NOTES

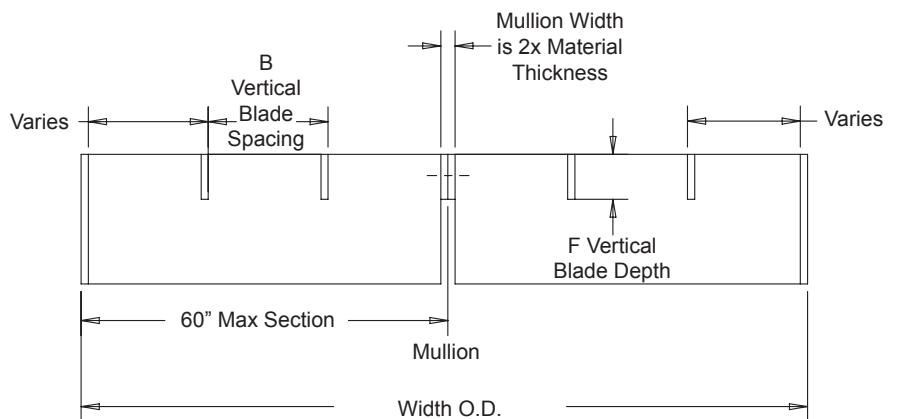
1. A = 2" - 12" Horizontal Blade Spacing
 B = 2" - 12" Vertical Blade Spacing
 C = .125" - .250" Material Thickness
 D = 2" - 6" Grille Depth
 E = 0° - 45° Blade Angle
 F = 1" Minimum Vertical Blade Depth

GRILLE SIZES

Panels	Min Panel	Max Single Panel
GS2C	12"W x 12"H	60"W x 96"H 40 sq.ft.



Optional Frames



air balance

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MODEL GS2C

Angular Continuous Line • Extruded Aluminum Grille Screen

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MODEL GS3C

Solar Angular Continuous Line • Extruded Aluminum Grille Screen

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .125" thick; 6063-T6/T52 extruded aluminum alloy
BLADES: .125" thick; 6063-T6/T52 extruded aluminum alloy
BLADE SPACING: 2" - 12" vertical and horizontal
ASSEMBLY: Welded
FINISH: Mill

OPTIONS

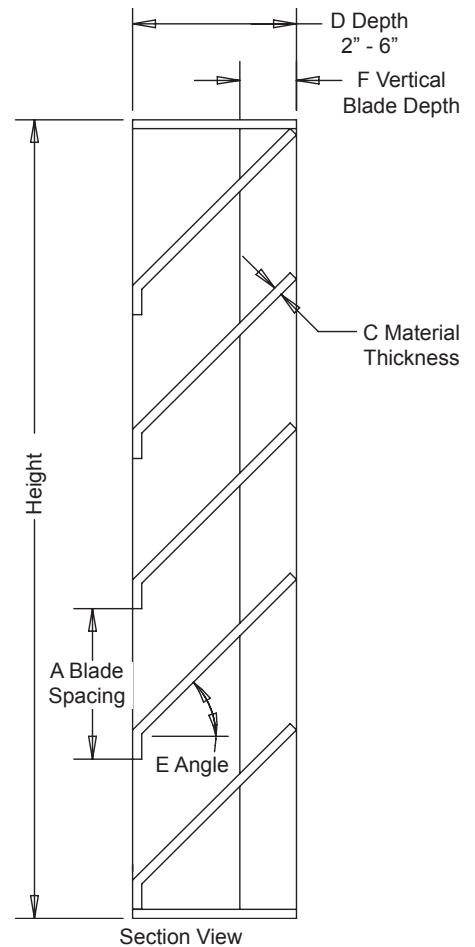
.125" - .250" Nominal Thickness (Frame and/or Blade)
 Blade Angle from 0° - 45°
 Grille Depth 2" - 6"

NOTES

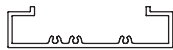
1. A = 2" - 12" Horizontal Blade Spacing
 B = 2" - 12" Vertical Blade Spacing
 C = .125" - .250" Material Thickness
 D = 2" - 6" Grille Depth
 E = 0° - 45° Blade Angle
 F = 1" Minimum Vertical Blade Depth

GRILLE SCREEN SIZES

Panels	Min Panel	Max Single Panel
GS3C	12"W x 12"H	60"W x 96"H 40 sq.ft.



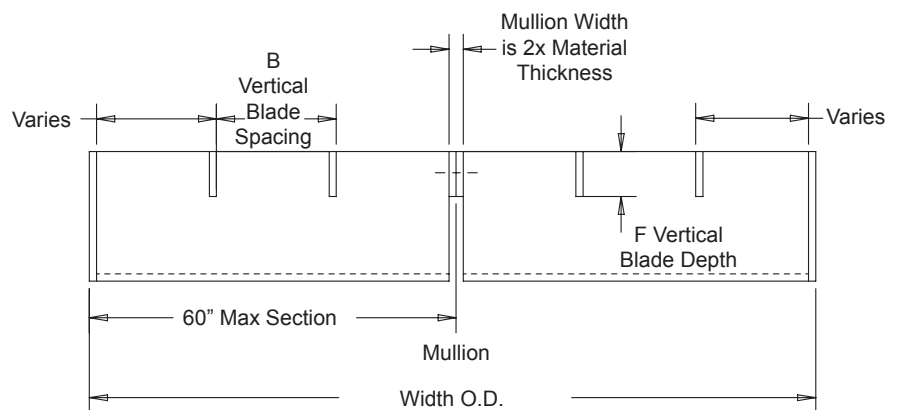
Channel Frame



Angle Frame



Optional Frames



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MODEL GS3C

Solar Angular Continuous Line • Extruded Aluminum Grille Screen

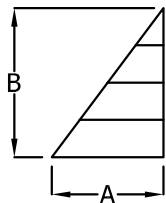
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Availability

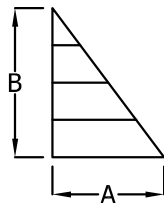
1. Accoustical, Sightproof, Adjustable and Combination louvers are not available.
2. Storm, Wind-Driven Rain, and Drainable louvers are not recommended and not AMCA Certified.

Procedure

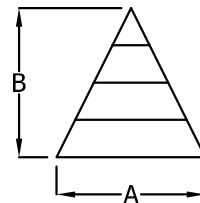
1. Refer to appropriate special shape for reference dimensions and adder.
2. Using 'A' and 'B' dimensions, price reference louver from appropriate louver category price matrix.
3. Multiply matrix price by model multiplier to determine reference model list price.
4. Multiply model price by special shape adder.
5. Add special shape adder price to model price along with adders for other required options.
 - * All louver options are adders to the model price (not the special shape price.)
 - * Hidden or Exposed Mullions must be identified and priced accordingly for multiple panel louvers.



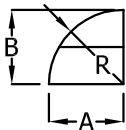
LEFT TRIANGLE



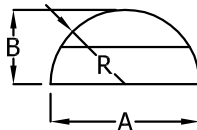
RIGHT TRIANGLE



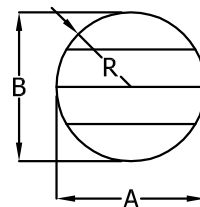
FULL TRIANGLE



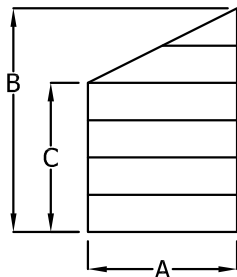
QUARTER ROUND



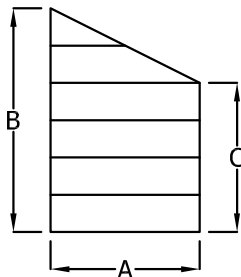
HALF ROUND



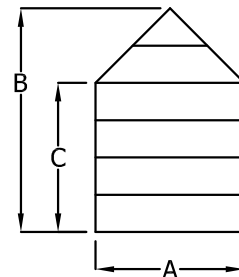
FULL ROUND



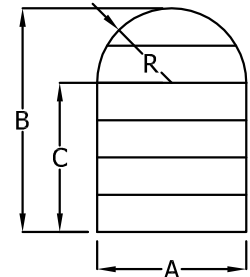
LEFT TRAPEZOID



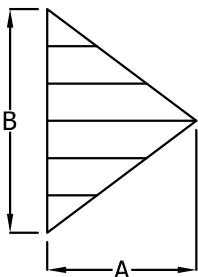
RIGHT TRAPEZOID



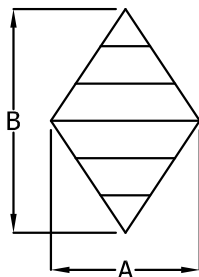
HOUSE



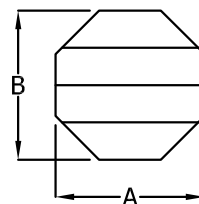
HALF ROUND TOP



HALF DIAMOND



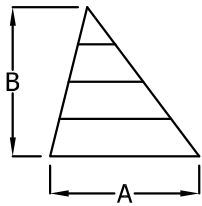
DIAMOND



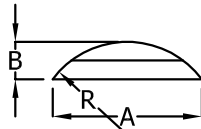
OCTAGON

Odd Shapes

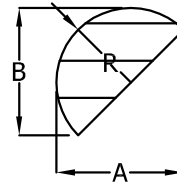
1. Odd shapes require drawings. The following are some examples.



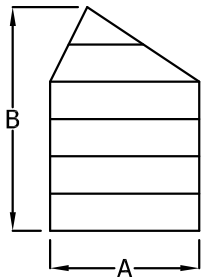
OFFSET TRIANGLE



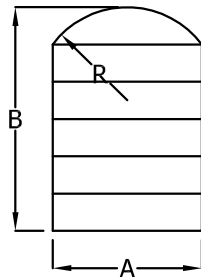
ARCH



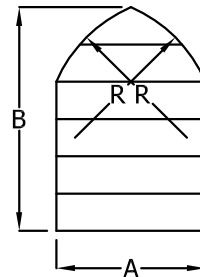
ANGLED HALF ROUND



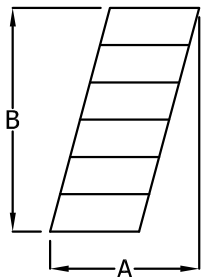
OFFSET HOUSE



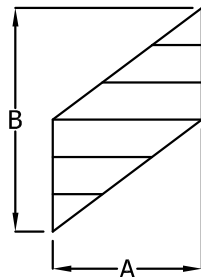
ARCH TOP



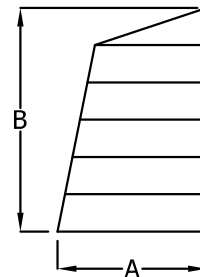
CATHEDRAL



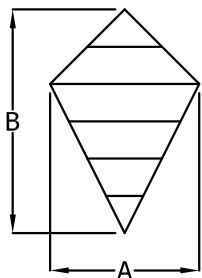
TYPE-A PARALLELOGRAM



TYPE-B PARALLELOGRAM



NO PARALLEL SIDES



OFFSET DIAMOND

COLOR SELECTION GUIDE

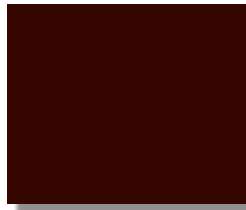
Fluropon® and Baked Powder Polyester Finishes



COAL BLACK



HARTFORD GREEN



DARK BRONZE



SANTE FE RED



ALAMO TAN



ARMY GRAY



AGED COPPER



MEDIUM BRONZE



BRICK RED



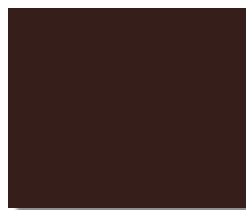
CITATION TAN



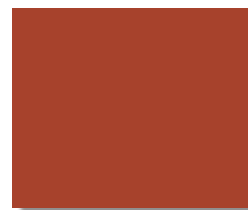
SLATE GRAY



IBM BLUE



REGAL BROWN



TERRA COTTA



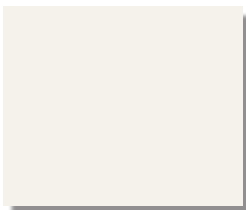
KHAKI



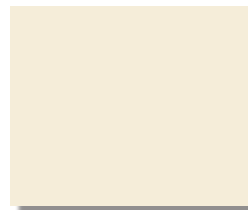
DOVE GRAY



SANDSTONE



BONE WHITE

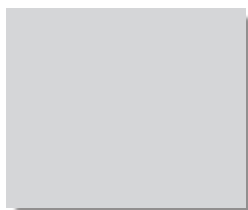


SIERRA WHITE



AUTUMN MIST

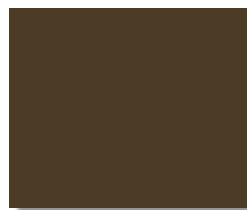
Anodized Finishes (Anodizing will have slight shade variations & is not warranted)



CLEAR
204R / 215 R1



LIGHT BRONZE
311



MEDIUM BRONZE
312



DARK BRONZE
313

These color samples are as close as possible to the actual colors offered within the limitations of color-ink to color-chip reproduction.

Fluropon®

This High Performance Fluoropolymer Thermosetting Resin powder paint system has a significantly higher surface hardness; mar resistance and abrasion resistance as compared to liquid based paint systems. Our paint system meets the stringent 4000 hours of salt spray performance, as required by AAMA 2605-02 as well as 2800 MJ, EMMAQUA (equals 10 year South Florida). We offer 20 solid stock colors as seen on our color chart. Custom colors are available to match any project. All of our powder paints supports Green Building Initiative/LEED.

Baked Powder Polyester

Designed for commercial applications, the Baked Powder Polyester is an Architectural Powder Coating that meets the stringent criteria of the AAMA 2604-02 specification and has been successfully tested in actual South Florida outdoor weathering. Our powder paint is engineered to meet the stringent 3000 hours of salt spray performance requirement of AAMA 2604-02. We offer 20 stock colors as seen on our color chart.

Other Coatings and Finishes

Fluoropolymer coatings in metallic, exotic and pearlescent formulations are also available in Fluropon Classic®, Fluropon Premier® and Fluropon Classic II®, respectively. In addition, we have the ability to apply baked enamel or specialized coatings for specific chemical environments and to complement roofing, window, panel, and siding systems. Please consult your sales representative for special pricing.

Anodized Finishes

Clear anodizing pre-oxidizes aluminum surfaces to provide a uniform satin finish that resists the natural oxidization that can occur with a mill finish. The 204R1 Clear (AA-M12C22A31) provides a Class II, 0.4 mil coating thickness and is used for normal weather exposure. The 215R1 clear (AA-12C22A41) provides a Class I, 0.7 mil coating thickness and is recommended when severe corrosive or abrasive atmospheric conditions exist.

Color anodizing in light, medium, or dark bronze are available and are electrolytically deposited to achieve a Class I, 0.7 mil coating. Anodized finishes are only available on aluminum. Anodizing will have slight shade variations and is not warranted.



www.spraylat.com

Steel Louvers

Extruded Stationary Louvers

- S245 — 2" Deep, Non-Drainable Blade, Steel, Stationary Louver
- S430 — 4" Deep, Non-Drainable Blade, Steel, Stationary Louver
- S465 — 4" Deep, Non-Drainable Blade, Steel, Stationary Louver
- S445 — 4" Deep, Drainable Blade, Steel, Stationary Louver
- S405 — 4" Deep, Baffle Blade, Steel, Stationary Louver
- S480 — 4" Deep, Inverted "V" Blade, Steel, Stationary Louver
- S605 — 6" Deep, Baffle Blade, Steel, Stationary Louver
- S630 — 6" Deep, Non-Drainable Blade, Steel, Stationary Louver
- S635 — 6" Deep, Drainable Blade, Steel, Stationary Louver
- S645 — 6" Deep, Drainable Blade, Steel, Stationary Louver
- S655 — 6" Deep, Non-Drainable Blade, Steel, Stationary Louver

Adjustable Louvers

- S445A — 4" Deep, 45° Drainable Blade, Steel, Adjustable Louver
- S455A — 4" Deep, 45° Straight Blade, Steel, Adjustable Louver
- S645A — 6" Deep, Drainable Blade, Steel, Adjustable Louver
- S695A — 6" Deep, Insulated Blade, Steel, Adjustable Louver

Combination Louvers

- S735C — 7" Deep, Drainable Blade, Steel, Combination Louver

air balance

Dampers  Louvers
UL Life Safety Products

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MODEL S245

2" Deep • 45° Non-Drainable Blade • Formed Steel Stationary Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 18-GA galvanized steel channel type**BLADES:** 18-GA galvanized steel**BLADE SPACING:** 2 1/8"**ASSEMBLY:** Riveted and/or welded for maximum service**FINISH:** Mill**SCREEN:** 1/2" sq. mesh 19-GA galvanized**OPTIONS**

Flange Frame

Extended Sub-Sills (3" or 5")

Sub-Frame

Installation Angles

Stainless Steel, Copper, Aluminum, Other Steel Gauges

Finishes - Baked Enamel, Epoxies

Variety of Bird and Insect Screens

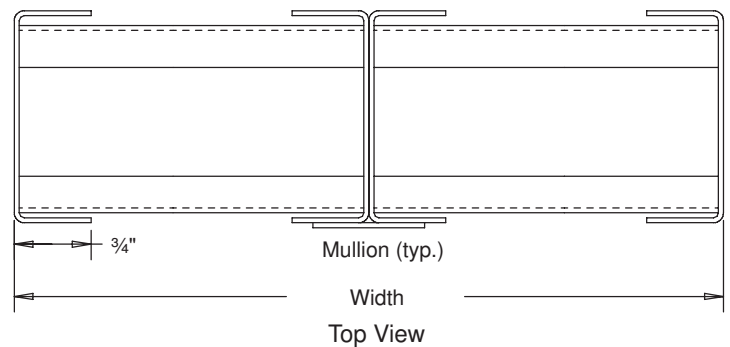
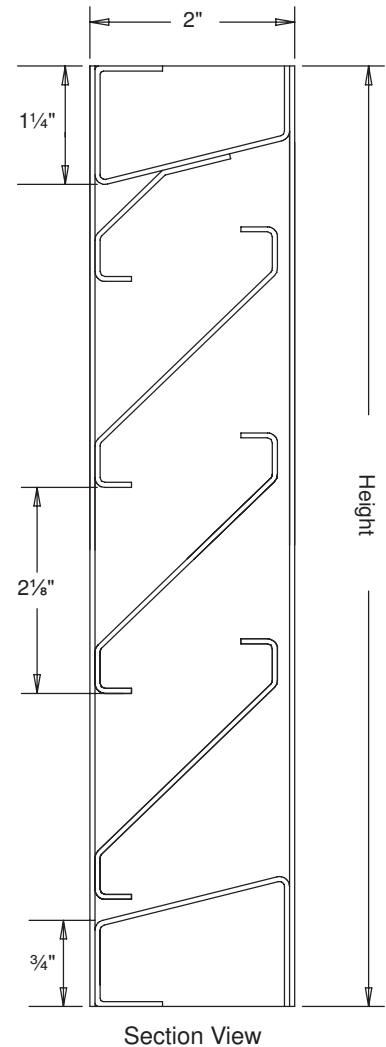
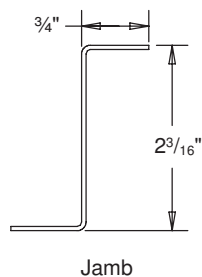
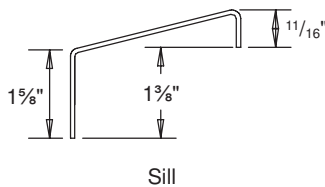
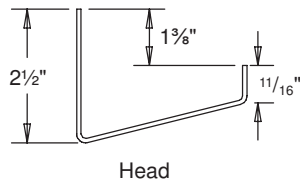
Blank-Off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undersize.
2. Approximate louver weight is 5 lbs./sq.ft.

LOUVER SIZE

Panels	Minimum Panel	Maximum Panel
S245	6"W x 5"H	60"W x 96"H



MODEL S245

2" Deep • 45° Non-Drainable Blade • Formed Steel Stationary Louver

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MODEL S430

4" Deep • 30° Non-Drainable Blade • Formed Steel Stationary Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 18-GA galvanized steel channel type**BLADES:** 18-GA galvanized steel**BLADE SPACING:** 3"**ASSEMBLY:** Riveted and/or welded for maximum service; Full jams with blades, head and sill contained within**FINISH:** Mill**SCREEN:** ½" sq. mesh 19-GA galvanized**OPTIONS**

Flange Frame

Extended Sub-Sills (3" or 5")

Sub-Frame

Installation Angles

Stainless Steel, Other Steel Gauges

Finishes - Baked Enamel, Epoxies

Variety of Bird and Insect Screens

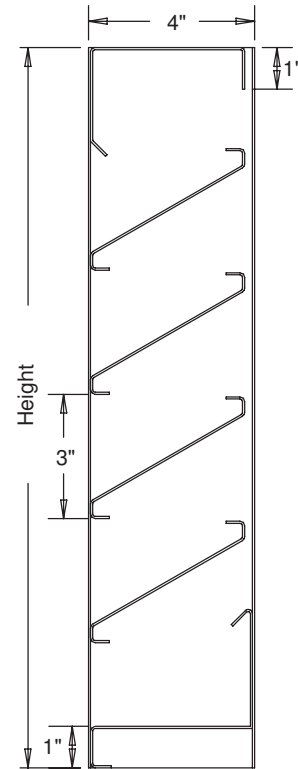
Blank-Off Panels

NOTES

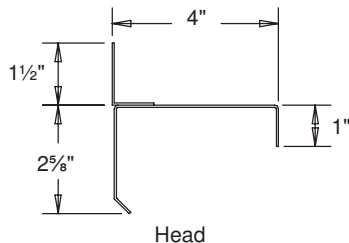
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2. Approximate louver weight is 10 lbs./sq.ft.

LOUVER SIZE

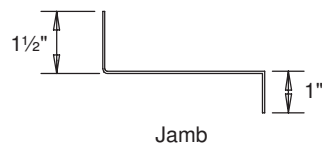
Panels	Minimum Panel	Maximum Panel
S430	12"W x 12"H	60"W x 96"H



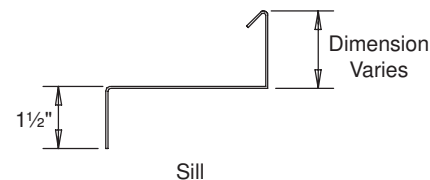
Section View



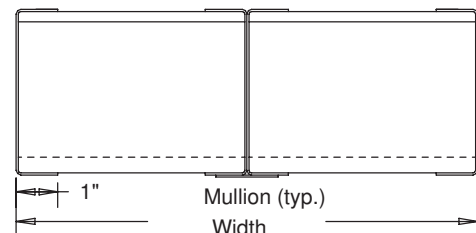
Head



Jamb



Sill



Top View

MODEL S430

4" Deep • 30° Non-Drainable Blade • Formed Steel Stationary Louver

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MODEL S465

4" Deep • 45° Non-Drainable Blade • Formed Steel Stationary Louver

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 18-GA galvanized steel channel type
BLADES: 18-GA galvanized steel
ASSEMBLY: Riveted and/or welded for maximum service; Full jambs with blades, head and sill contained within
FINISH: Mill
SCREEN: ½" sq. mesh 19-GA galvanized

OPTIONS

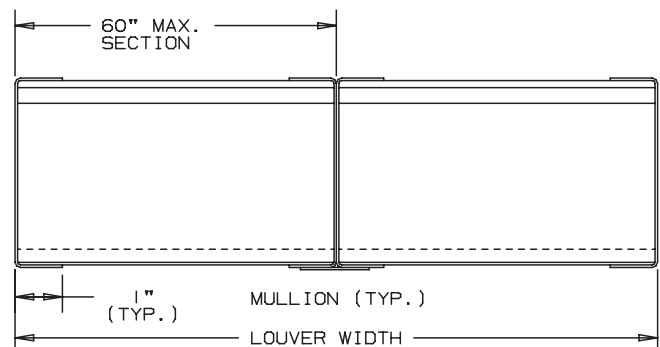
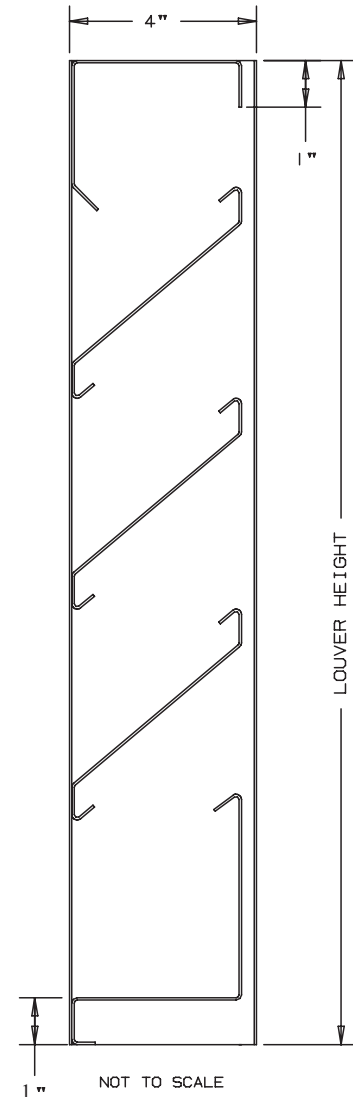
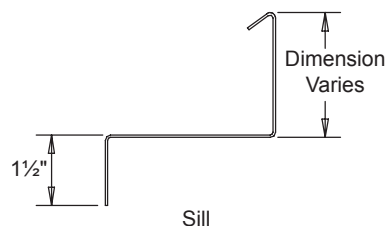
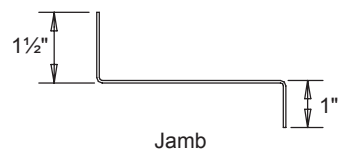
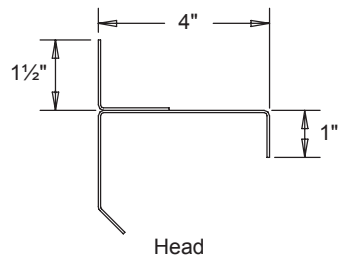
Flange Frame
 Extended Sub-Sills (3" or 5")
 Sub-Frame
 Installation Angles
 Stainless Steel, Other Steel Gauges
 Finishes - Baked Enamel, Epoxies
 Variety of Bird and Insect Screens
 Blank-Off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undersize.
2. Approximate louver weight is 7 lbs./sq.ft.

LOUVER SIZE

Panels	Minimum Panel	Maximum Panel
S465	12"W x 12"H	60"W x 96"H



MODEL S465

4" Deep • 45° Non-Drainable Blade • Formed Steel Stationary Louver

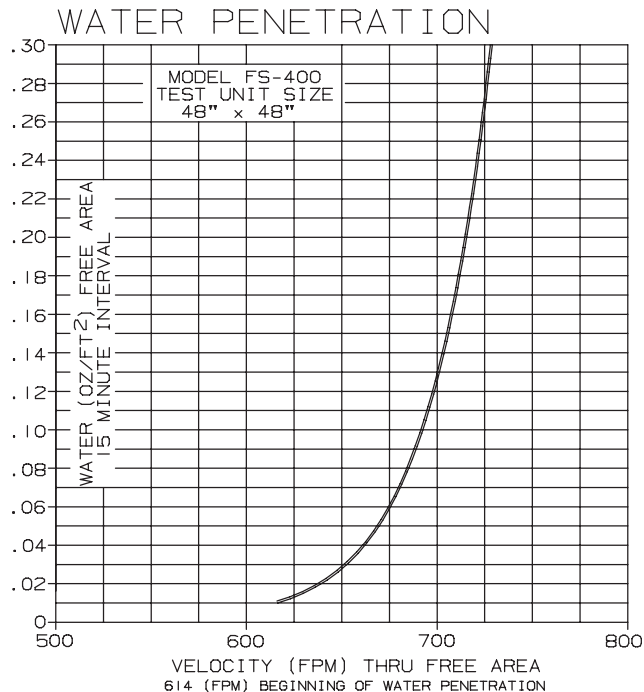
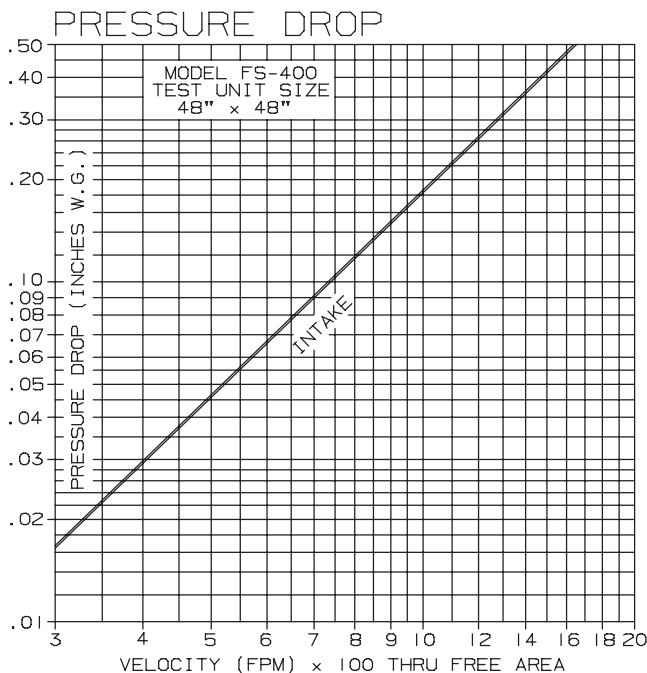
Water Penetration: .01 oz at 614 fpm maximum recommended free area velocity

Pressure Drop: .07 in.wg at 614 fpm and 4980 SCFM

Free Area: 8.11 sq.ft. = 51% for 48"W x 48"H test size

Performance Data

Tests of a 48"W x 48"H sample by an AMCA Registered Laboratory according to AMCA Standard 500 shows water penetration to be less than .02 oz/sq.ft. water penetration at 630 fpm (Free Area Velocity) with less than .08 in.wg pressure drop. Ratings do not include effects of birdscreen.



FREE AREA

		FREE AREA (SQ. FT.)								
		WIDTH								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
HEIGHT	12"	.26	.41	.57	.72	.87	1.03	1.18	1.34	1.49
	24"	.75	1.20	1.65	2.10	2.55	3.00	3.45	3.90	4.36
	36"	1.27	2.03	2.80	3.56	4.32	5.09	5.85	6.61	7.37
	48"	1.77	2.82	3.88	4.94	6.00	7.06	8.11	9.18	10.24
	60"	2.33	3.72	5.12	6.51	7.91	9.30	10.70	12.09	13.49
	72"	2.82	4.51	6.20	7.89	9.59	11.28	12.97	14.66	16.35
	84"	3.31	5.30	7.29	9.28	11.26	13.25	15.24	17.23	19.22
	96"	3.81	6.09	8.37	10.66	12.94	15.23	17.51	19.80	22.08



Air Balance certifies that the model S465 louvers shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The Certified Ratings Seal applies to Air Performance and Water Penetration Ratings.

In the interest of product development, Air Balance reserves the right to make changes without notice.
450 Riverside Drive • Wyalusing, PA 18853 • Phone: (570) 746-1888 • Fax: (570) 746-9286

air balance
Dampers • Louvers
Life Safety Products
Division of Mestek
Member of AMCA

MODEL S445

4" Deep • 45° Drainable Blade • Formed Steel Stationary Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 18-GA galvanized steel channel type**BLADES:** 18-GA galvanized steel**ASSEMBLY:** Riveted and/or welded for maximum service; Full jambs with blades, head and sill contained within**FINISH:** Mill**SCREEN:** ½" sq. mesh 19-GA galvanized**OPTIONS**

Flange Frame

Extended Sub-Sills (3" or 5")

Sub-Frame

Installation Angles

Stainless Steel, Other Steel Gauges

Finishes - Baked Enamel, Epoxies

Variety of Bird and Insect Screens

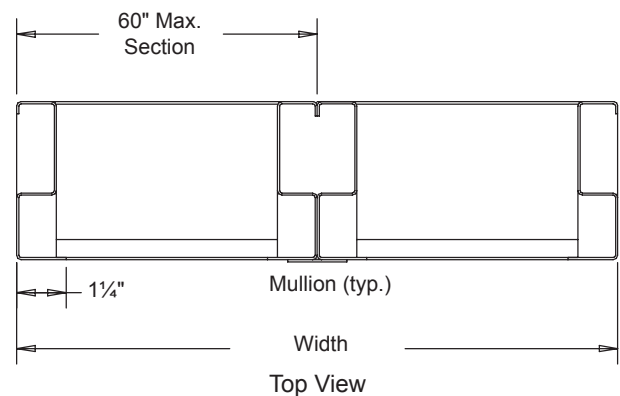
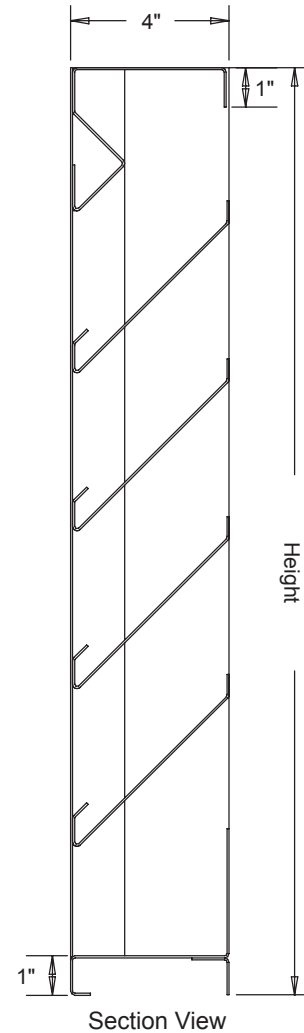
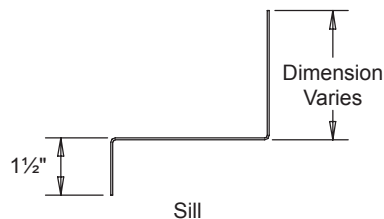
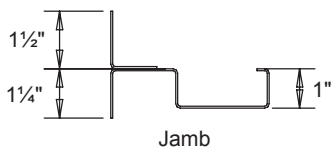
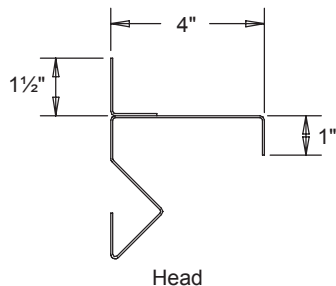
Blank-Off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undersize.
2. Approximate louver weight is 6 lbs./sq.ft.

LOUVER SIZE

Panels	Minimum Panel	Maximum Panel
S445	12"W x 12"H	60"W x 96"H

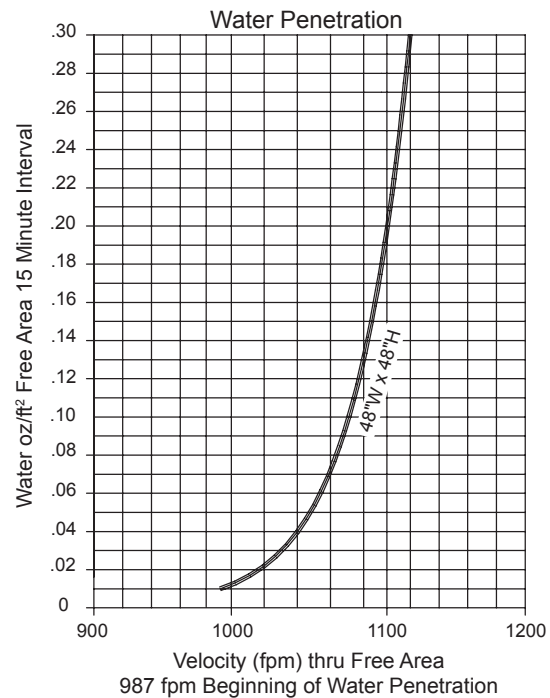
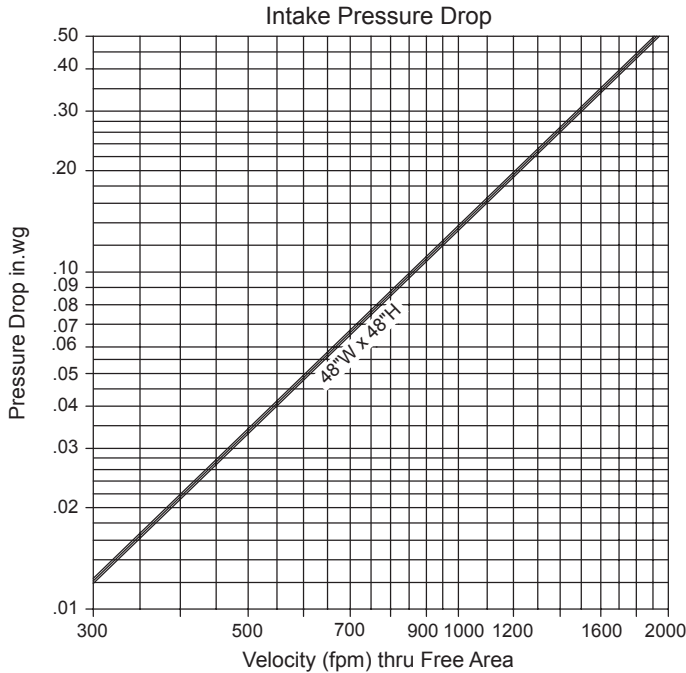


MODEL S445

4" Deep • 45° Drainable Blade • Formed Steel Stationary Louver

Water Penetration: 900 fpm maximum recommended free area velocity**Pressure Drop:** .13 in.wg at 987 fpm and 7896 SCFM**Free Area:** 8.0 sq.ft. = 50% for 48"W x 48"H test size**Performance Data**

Tests of a 48"W x 48"H sample by an AMCA Registered Laboratory according to AMCA Standard 500 shows water penetration to be less than .02 oz/sq.ft. water penetration at 1000 fpm (Free Area Velocity) with less than .14 in.wg pressure drop. Ratings do not include effects of birdscreen.



Free Area sq.ft.

		Width								
Height		12	18	24	30	36	42	48	54	60
	12	.27	.45	.62	.80	.97	1.14	1.32	1.49	1.66
	24	.75	1.22	1.70	2.17	2.65	3.12	3.59	4.07	4.54
	36	1.23	2.00	2.78	3.55	4.32	5.10	5.87	6.65	7.42
	48	1.70	2.78	3.85	4.93	6.00	7.08	8.00	9.23	10.30
	60	2.18	3.55	4.93	6.31	7.68	9.06	10.43	11.81	13.18
	72	2.65	4.33	6.01	7.68	9.36	11.04	12.71	14.39	16.06
	84	3.13	5.11	7.08	9.06	11.04	13.01	14.99	16.97	18.94
	96	3.61	5.88	8.16	10.44	12.72	14.99	17.27	19.55	21.83



ABI certifies that the model S445 louvers shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The Certified Ratings Seal applies to Air Performance and Water Penetration Ratings.

MODEL S405

4" Deep • 45° Baffle Blade • Formed Steel Stationary Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 18-GA galvanized steel channel type**BLADES:** 18-GA galvanized steel**ASSEMBLY:** Riveted and/or welded for maximum service; Full jambs with blades, head and sill contained within**FINISH:** Mill**SCREEN:** ½" sq. mesh 19-GA galvanized**OPTIONS**

Flange Frame

Extended Sub-Sills (3" or 5")

Sub-Frame

Installation Angles

Stainless Steel, Other Steel Gauges

Finishes - Baked Enamel, Epoxies

Variety of Bird and Insect Screens

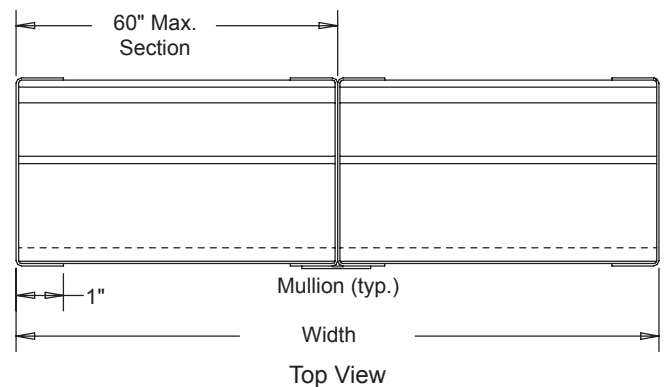
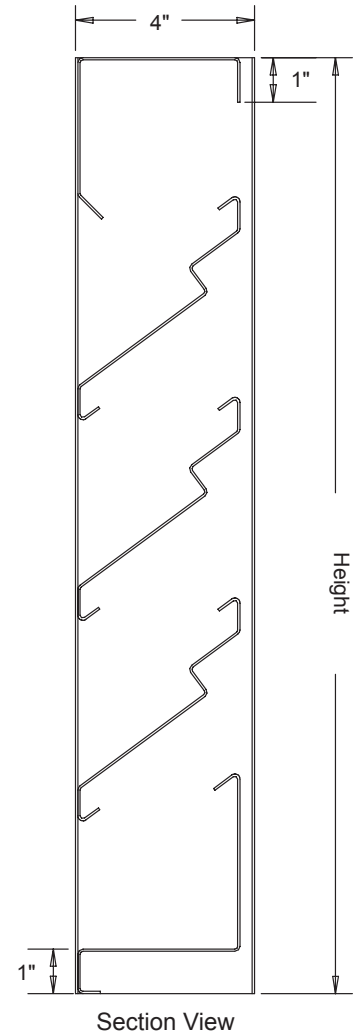
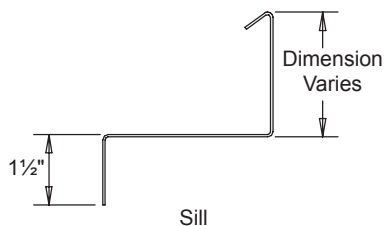
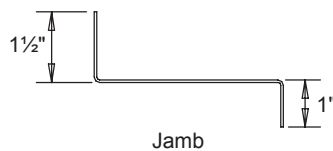
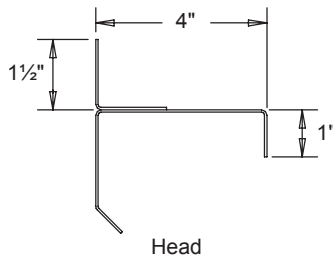
Blank-Off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undersize.
2. Approximate louver weight is 7 lbs./sq.ft.

LOUVER SIZE

Panels	Minimum Panel	Maximum Panel
S405	12"W x 12"H	60"W x 96"H

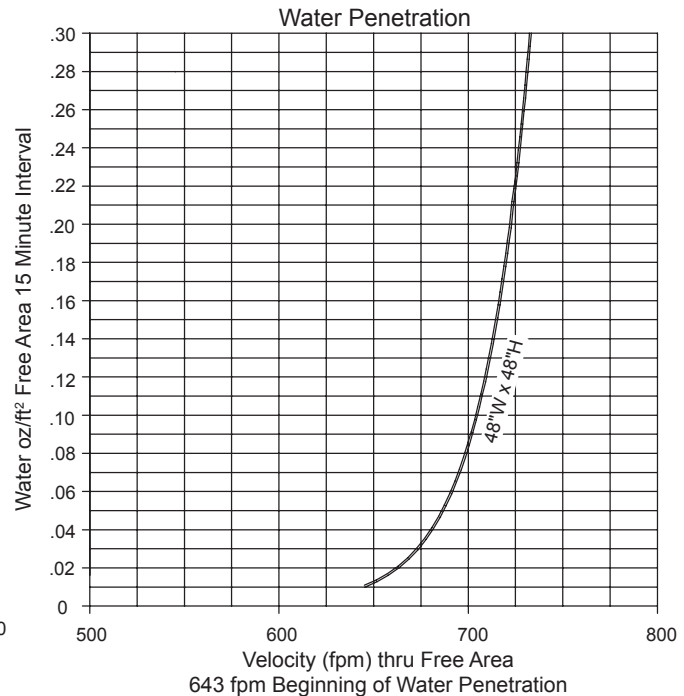
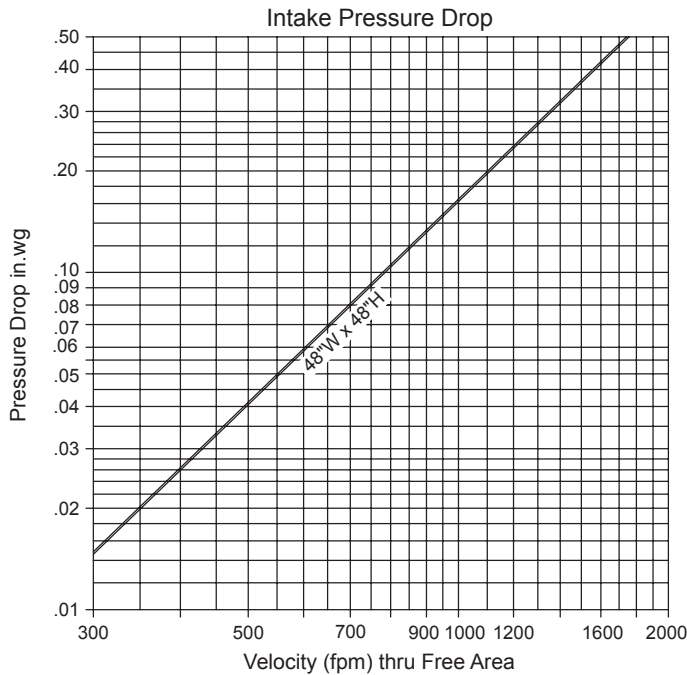


MODEL S405

4" Deep • 45° Baffle Blade • Formed Steel Stationary Louver

Water Penetration: 600 fpm maximum recommended free area velocity**Pressure Drop:** .07 in.wg at 643 fpm and 5305 SCFM**Free Area:** 8.25 sq.ft. = 51.6% for 48"W x 48"H test size**Performance Data**

Tests of a 48"W x 48"H sample by an AMCA Registered Laboratory according to AMCA Standard 500 shows water penetration to be less than .02 oz/sq.ft. water penetration at 650 fpm (Free Area Velocity) with less than .07 in.wg pressure drop. Ratings do not include effects of birdscreen.



Free Area sq.ft.

		Width								
Height		12	18	24	30	36	42	48	54	60
	12	.26	.41	.57	.72	.87	1.03	1.18	1.34	1.49
	24	.78	1.25	1.71	2.18	2.65	3.12	3.58	4.05	4.52
	36	1.27	2.03	2.80	3.56	4.32	5.08	5.85	6.61	7.37
	48	1.76	2.82	3.88	4.94	6.00	7.05	8.25	9.17	10.23
	60	2.32	3.72	5.11	6.50	7.89	9.29	10.68	12.07	13.47
	72	2.81	4.50	6.19	7.87	9.56	11.25	12.94	14.62	16.31
	84	3.30	5.28	7.26	9.24	11.21	13.19	15.17	17.15	19.13
	96	3.78	6.06	8.33	10.60	12.87	15.14	17.41	19.68	21.95



ABI certifies that the model S405 louvers shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The Certified Ratings Seal applies to Air Performance and Water Penetration Ratings.

MODEL S480

4" Deep • Inverted "V" Blade • Formed Steel Stationary Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 18-GA galvanized steel channel type**BLADES:** 18-GA galvanized steel**BLADE SPACING:** 3"**ASSEMBLY:** Riveted and/or welded for maximum service**FINISH:** Mill**SCREEN:** 1/2" mesh 19-GA galvanized**OPTIONS**

Flange Frame

Extended Sub-Sills (3" or 5")

Sub-Frame

Installation Angles

Stainless Steel, Copper, Aluminum, Other Steel Gauges

Finishes - Baked Enamel, Epoxies

Variety of Bird and Insect Screens

Blank-Off Panels

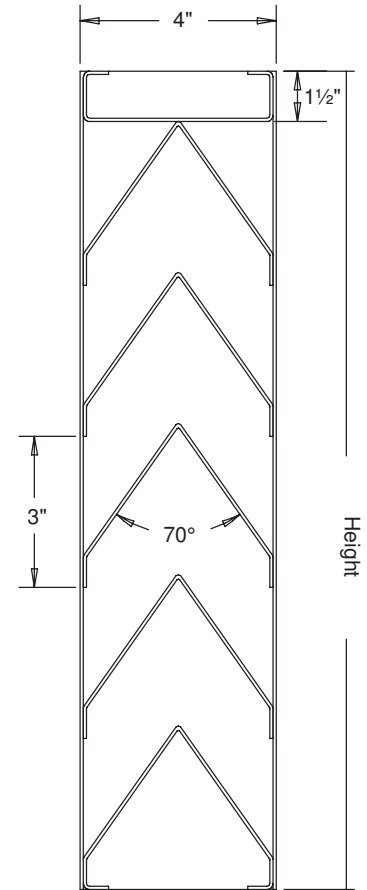
NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undersize.

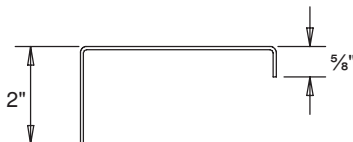
2. Approximate louver weight is 10 lbs./sq.ft.

LOUVER SIZE

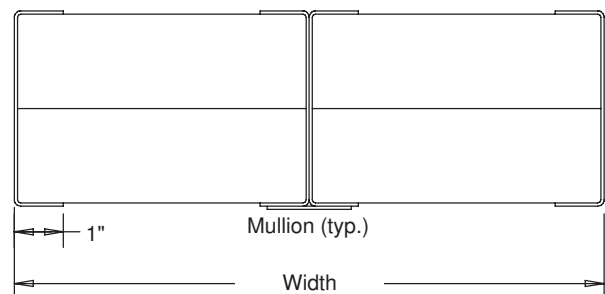
Panels	Minimum Panel	Maximum Panel
S480	12"W x 12"H	60"W x 96"H



Section View



Optional Flange Frame



Top View

MODEL S480

4" Deep • Inverted "V" Blade • Formed Steel Stationary Louver

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MODEL S605

6" Deep • 45° Blade • Formed Steel Stationary Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 18-GA galvanized steel channel type**BLADES:** 18-GA galvanized steel**ASSEMBLY:** Riveted and/or welded; Full jambs with blades, head and sill contained within**FINISH:** Mill**SCREEN:** ½" sq. mesh 19-GA galvanized**OPTIONS**

Flange Frame

Extended Sub-Sills (3" or 5")

Sub-Frame

Installation Angles

Stainless Steel, Other Steel Gauges

Finishes - Baked Enamel, Epoxies

Variety of Bird and Insect Screens

Blank-Off Panels

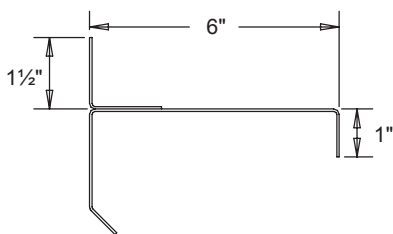
NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undersize.

2. Approximate louver weight is 8½ lbs./sq.ft.

LOUVER SIZE

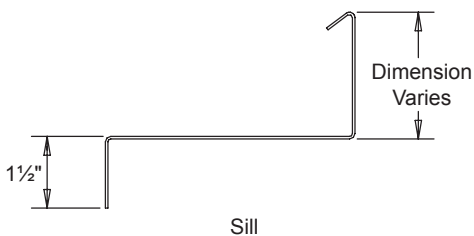
Panels	Minimum Panel	Maximum Panel
S605	12"W x 12"H	60"W x 96"H



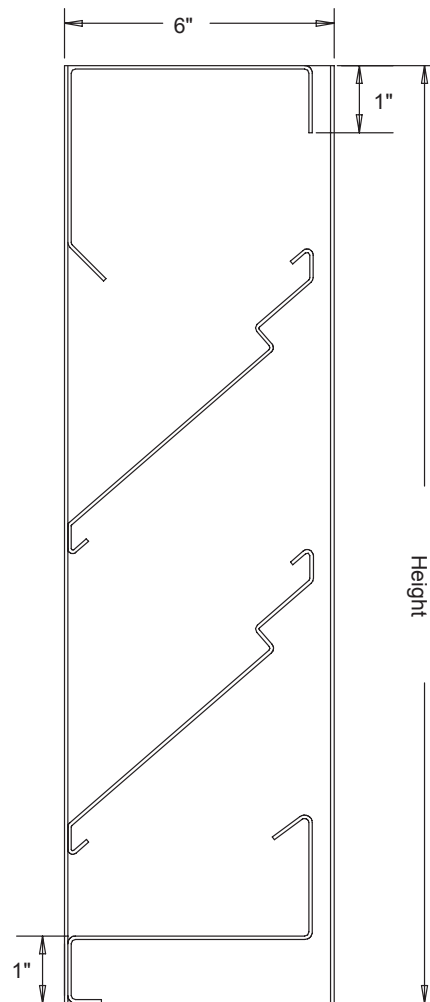
Head



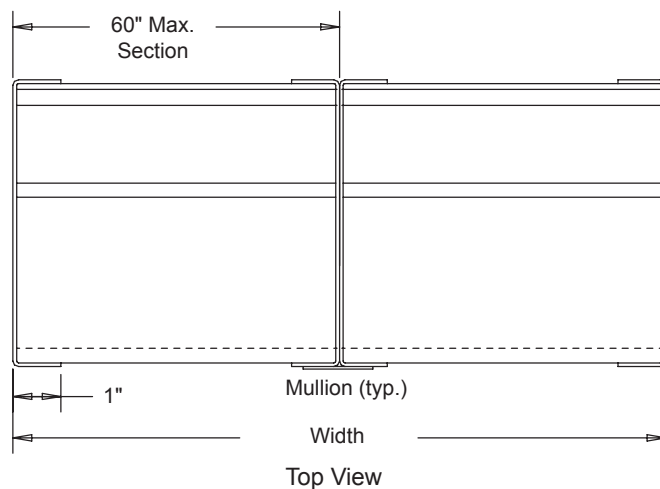
Jamb



Sill



Section View



MODEL S605

6" Deep • 45° Baffle Blade • Formed Steel Stationary Louver

Ratings do not include the effect of birdscreen.

Free Area sq.ft.										
Width										
Height		12	18	24	30	36	42	48	54	60
	12	.20	.32	.45	.57	.69	.81	.93	1.06	1.18
	24	.59	.95	1.31	1.67	2.02	2.38	2.74	3.09	3.45
	36	1.12	1.80	2.47	3.15	3.82	4.50	5.17	5.84	6.52
	48	1.57	2.25	3.46	4.41	5.35	6.30	7.33	8.19	9.13
	60	2.10	3.37	4.63	5.89	7.15	8.41	9.67	10.94	12.20
	72	2.55	4.08	5.61	7.14	8.67	10.20	11.73	13.26	14.79
	84	3.19	5.11	7.03	8.94	10.86	12.78	14.69	16.61	18.52
	96	3.39	5.42	7.45	9.48	11.51	13.55	15.58	17.61	19.64

MODEL S630

6" Deep • 30°Non-Drainable Blade • Formed Steel Stationary Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 18-GA galvanized steel channel type**BLADES:** 18-GA galvanized steel**BLADE SPACING:** 4"**ASSEMBLY:** Riveted and/or welded for maximum service; Full jams with blades, head and sill contained within**FINISH:** Mill**SCREEN:** ½" sq. mesh 19-GA galvanized**OPTIONS**

Flange Frame

Extended Sub-Sills (3" or 5")

Sub-Frame

Installation Angles

Stainless Steel, Other Steel Gauges

Finishes - Baked Enamel, Epoxies

Variety of Bird and Insect Screens

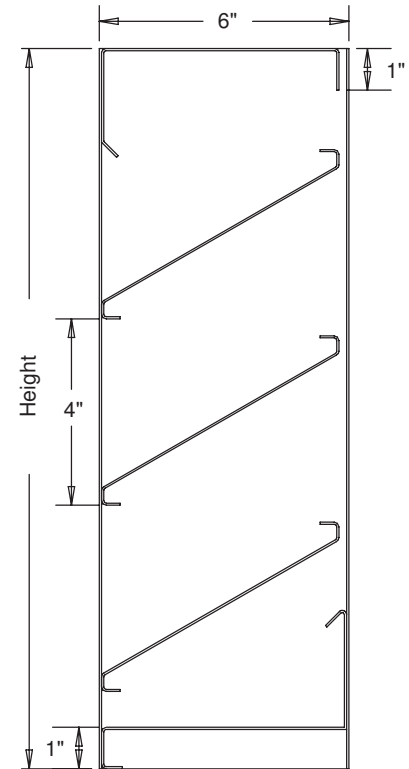
Blank-Off Panels

NOTES

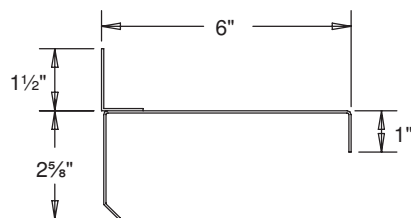
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undersize.
2. Approximate louver weight is 11 lbs./sq.ft.

LOUVER SIZE

Panels	Minimum Panel	Maximum Panel
S630	12"W x 12"H	60"W x 96"H



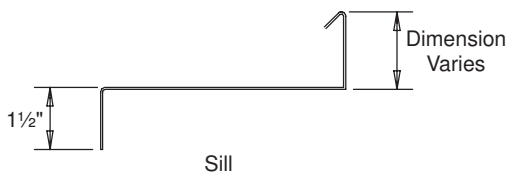
Section View



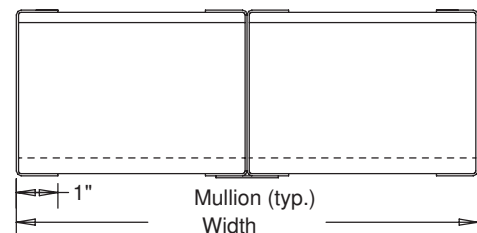
Head



Jamb



Sill



Top View

MODEL S630

6" Deep • 30° Non-Drainable Blade • Formed Steel Stationary Louver

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MODEL S635

6" Deep • 35° Drainable Blade • Formed Steel Stationary Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 18-GA galvanized steel channel type**BLADES:** 18-GA galvanized steel**ASSEMBLY:** Riveted and/or welded for maximum service; Full sill with blades and head contained within**FINISH:** Mill**SCREEN:** ½" sq. mesh 19-GA galvanized**OPTIONS**

Flange Frame

Extended Sub-Sills (3" or 5")

Sub-Frame

Installation Angles

Stainless Steel, Other Steel Gauges

Finishes - Baked Enamel, Epoxies

Variety of Bird and Insect Screens

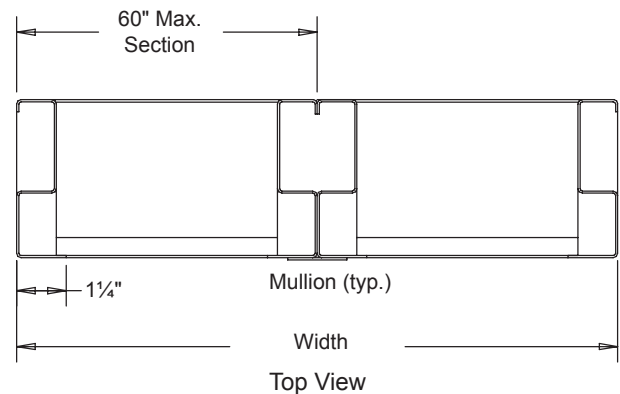
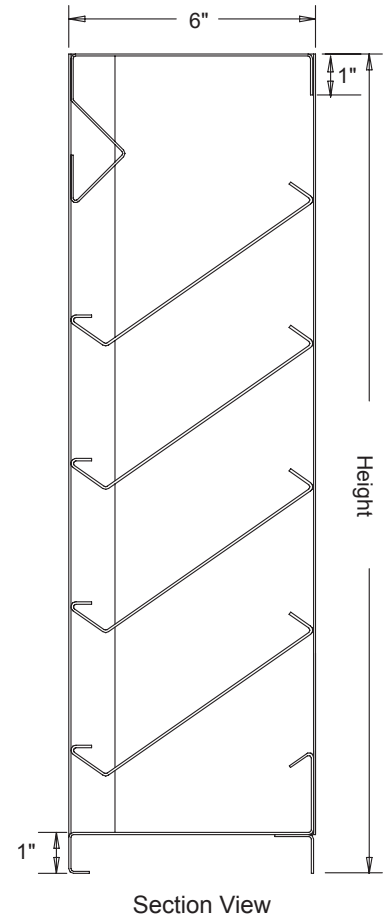
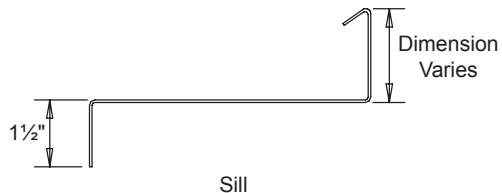
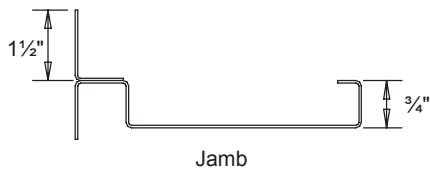
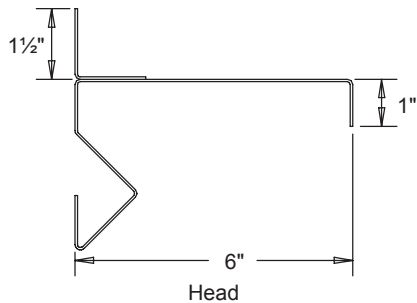
Blank-Off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undersize.
2. Approximate louver weight is 8 lbs./sq.ft.

LOUVER SIZE

Panels	Minimum Panel	Maximum Panel
S635	12"W x 12"H	60"W x 96"H

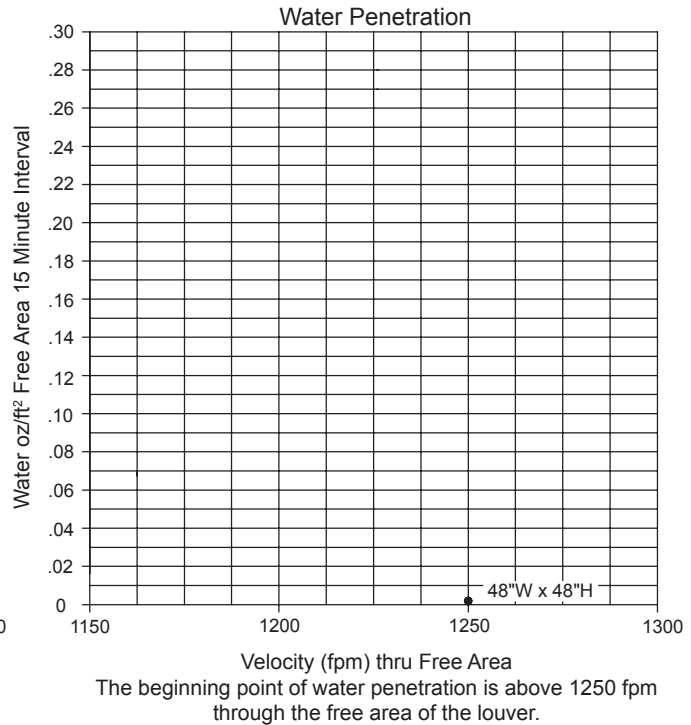
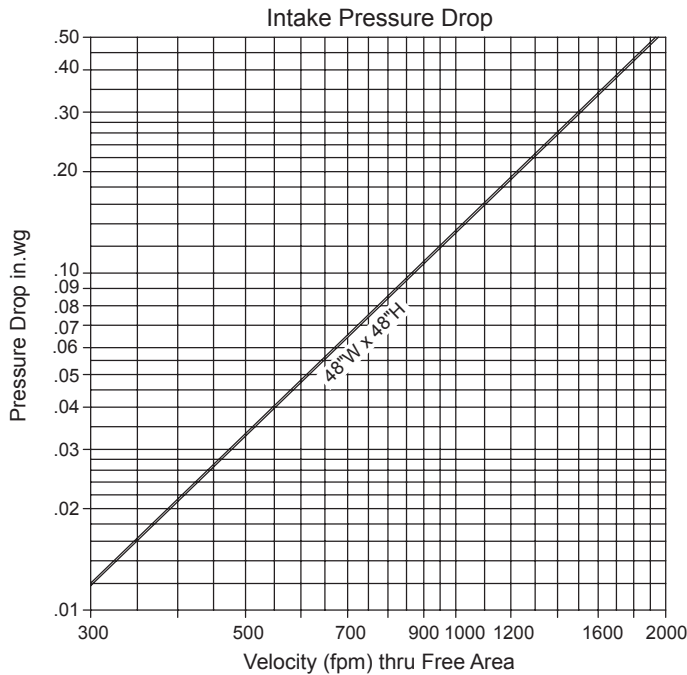


MODEL S635

6" Deep • 35° Drainable Blade • Formed Steel Stationary Louver

Water Penetration: 1200 fpm maximum recommended free area velocity**Pressure Drop:** .14 in.wg at 1250 fpm and 11050 SCFM**Free Area:** 8.84 sq.ft. = 55% for 48"W x 48"H test size**Performance Data**

Tests of a 48"W x 48"H sample by an AMCA Registered Laboratory according to AMCA Standard 500 shows water penetration to be less than .02 oz/sq.ft. water penetration at 1250 fpm (Free Area Velocity) with less than .13 in.wg pressure drop at 950 fpm (intake). Ratings do not include effects of birdscreen.



Free Area sq.ft.

		Width								
Height		12	18	24	30	36	42	48	54	60
	12	.33	.52	.72	.91	1.11	1.31	1.50	1.70	1.89
	24	.82	1.32	1.81	2.31	2.80	3.30	3.79	4.29	4.78
	36	1.30	2.08	2.86	3.64	4.42	5.20	5.98	6.76	7.54
	48	1.89	3.02	4.15	5.28	6.41	7.54	8.84	9.81	10.94
	60	2.32	3.70	5.09	6.48	7.87	9.26	10.65	12.04	13.43
	72	2.89	4.63	6.37	8.10	9.84	11.58	13.32	15.05	16.79
	84	3.39	5.42	7.45	9.48	11.52	13.55	15.58	17.61	19.64
	96	3.90	6.24	8.59	10.93	13.27	15.61	17.95	20.30	22.64



ABI certifies that the model S635 louvers shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The Certified Ratings Seal applies to Air Performance and Water Penetration Ratings.

MODEL S645

6" Deep • 45° Drainable Blade • Formed Steel Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 18-GA galvanized steel channel type**BLADES:** 18-GA galvanized steel**ASSEMBLY:** Riveted and/or welded for maximum service; Full sill with blades and head contained within**FINISH:** Mill**SCREEN:** ½" sq. mesh 19-GA galvanized**OPTIONS**

Flange Frame

Extended Sub-Sills (3" or 5")

Sub-Frame

Installation Angles

Stainless Steel, Other Steel Gauges

Finishes - Baked Enamel, Epoxies

Variety of Bird and Insect Screens

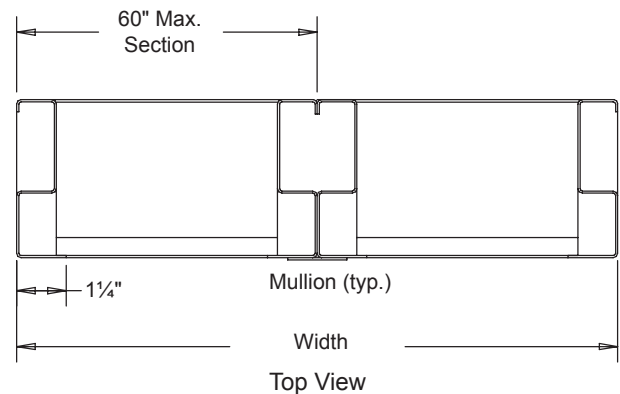
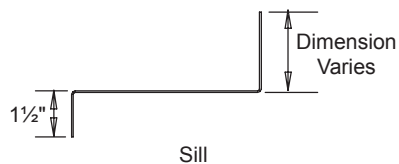
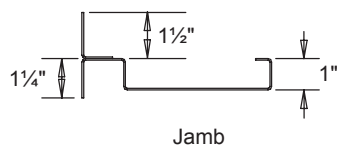
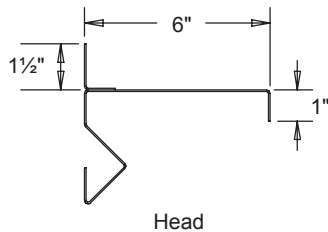
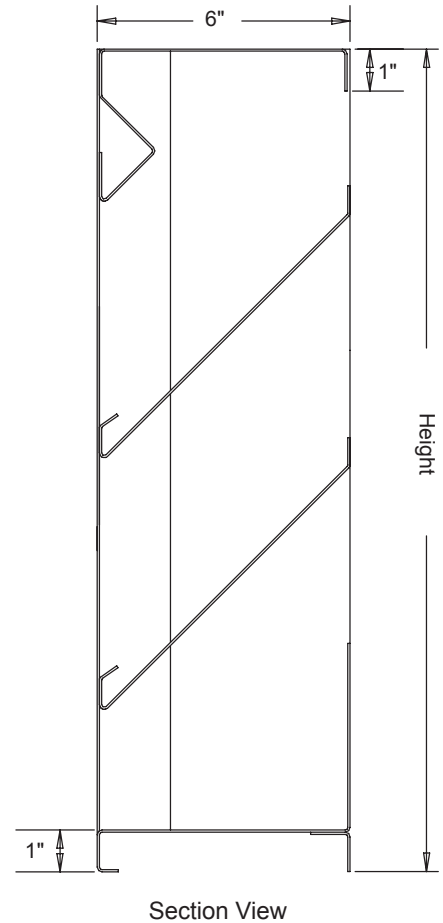
Blank-Off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undersize.
2. Approximate louver weight is 7 lbs./sq.ft.

LOUVER SIZE

Panels	Minimum Panel	Maximum Panel
S645	12"W x 12"H	60"W x 96"H

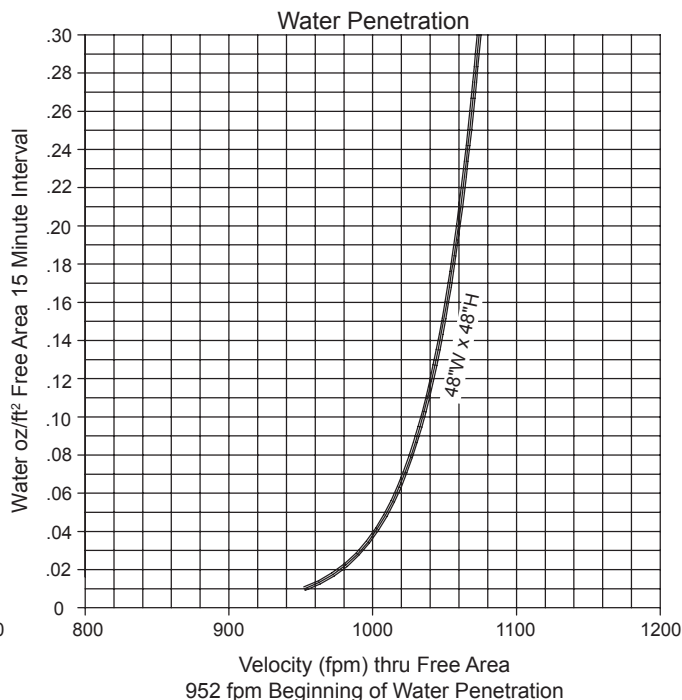
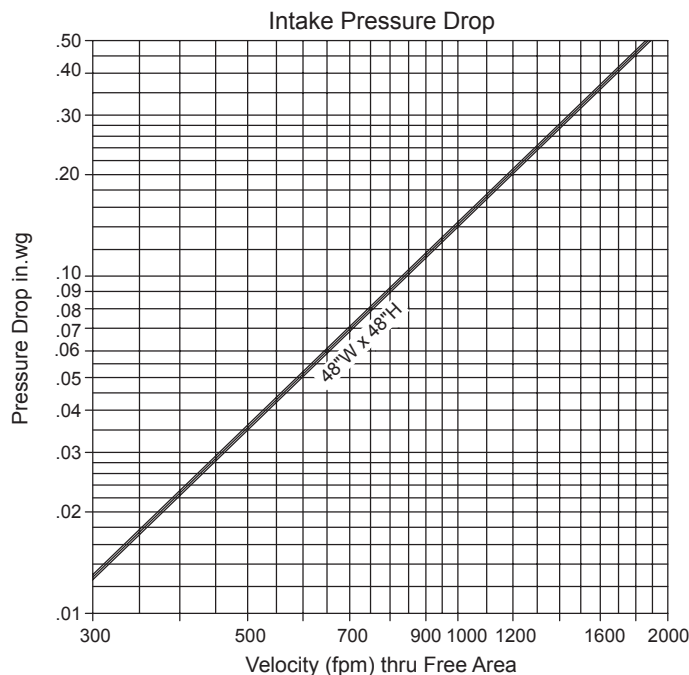


MODEL S645

6" Deep • 45° Drainable Blade • Formed Steel Louver

Water Penetration: 900 fpm maximum recommended free area velocity**Pressure Drop:** .14 in.wg at 952 fpm and 7911 SCFM**Free Area:** 8.31 sq.ft. = 52% for 48"W x 48"H test size**Performance Data**

Tests of a 48"W x 48"H sample by an AMCA Registered Laboratory according to AMCA Standard 500 shows water penetration to be less than .02 oz/sq.ft. water penetration at 950 fpm (Free Area Velocity) with less than .14 in.wg pressure drop. Ratings do not include effects of birdscreen.



Free Area sq.ft.

		Width								
Height		12	18	24	30	36	42	48	54	60
	12	.26	.42	.58	.74	.90	1.07	1.23	1.39	1.55
	24	.76	1.24	1.71	2.19	2.67	3.15	3.63	4.10	4.58
	36	1.26	2.05	2.85	3.64	4.44	5.23	6.02	6.82	7.61
	48	1.76	2.87	3.98	5.09	6.20	7.31	8.31	9.53	10.64
	60	2.26	3.69	5.11	6.54	7.97	9.39	10.82	12.25	13.67
	72	2.76	4.50	6.25	7.99	9.73	11.47	13.22	14.96	16.70
	84	3.26	5.32	7.38	9.44	11.50	13.56	15.62	17.67	19.73
	96	3.76	6.14	8.51	10.89	13.26	15.64	18.01	20.39	22.76



ABI certifies that the model S645 louvers shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The Certified Ratings Seal applies to Air Performance and Water Penetration Ratings.

MODEL S655

6" Deep • 45° Non-Drainable Blade • Formed Steel Stationary Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 18-GA galvanized steel channel type**BLADES:** 18-GA galvanized steel**ASSEMBLY:** Riveted and/or welded; Full jambs with blades, head and sill contained within**FINISH:** Mill**SCREEN:** ½" sq. mesh 19-GA galvanized**OPTIONS**

Flange Frame

Extended Sub-Sills (3" or 5")

Sub-Frame

Installation Angles

Stainless Steel, Other Steel Gauges

Finishes - Baked Enamel, Epoxies

Variety of Bird and Insect Screens

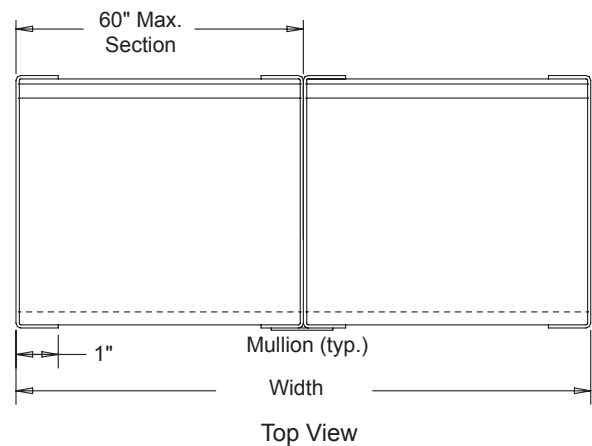
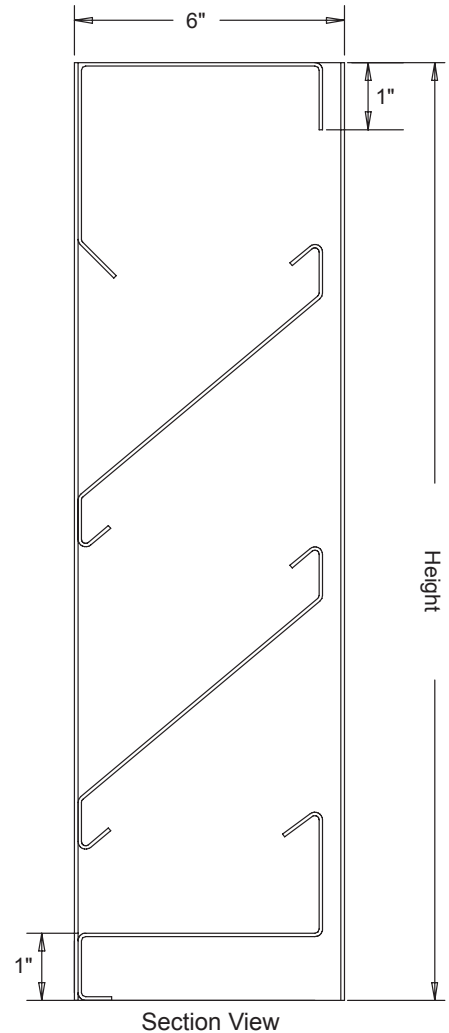
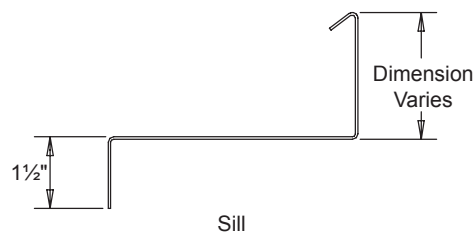
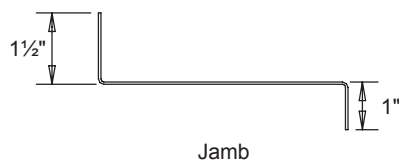
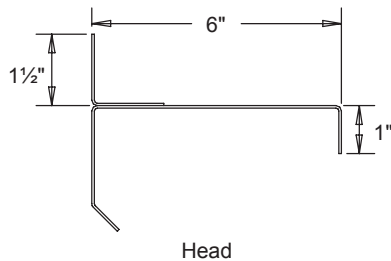
Blank-Off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undersize.
2. Approximate louver weight is 8½ lbs./sq.ft.

LOUVER SIZE

Panels	Minimum Panel	Maximum Panel
S655	12"W x 12"H	60"W x 96"H



MODEL S655

6" Deep • 45° Non-Drainable Blade • Formed Steel Stationary Louver

Eatings do not nclude the effect of birdscreen.

		Free Area sq.ft.								
		Width								
Height		12	18	24	30	36	42	48	54	60
	12	.19	.31	.42	.53	.65	.76	.88	.99	1.11
	24	.56	.89	1.23	1.56	1.90	2.23	2.57	2.90	3.24
	36	1.05	1.68	2.31	2.94	3.56	4.19	4.82	5.45	6.08
	48	1.61	2.58	3.54	4.51	5.48	6.44	7.41	8.38	9.34
	60	2.17	3.48	4.78	6.09	7.39	8.69	10.00	11.30	12.61
	72	2.71	4.33	5.95	7.58	9.20	10.83	12.45	14.08	15.70
	84	3.17	5.08	6.98	8.89	10.79	12.69	14.60	16.50	18.40
	96	3.54	5.67	7.80	9.92	12.05	14.18	16.30	18.43	20.56

MODEL S445A

4" Deep • 45° Drainable Blade • Formed Steel Louver

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 18-GA galvanized steel
BLADES: 18-GA galvanized steel
ASSEMBLY: Mechanically fastened
AXLES: 1/2" dia. plated steel stub
LINKAGE: Chevron type formed bracket of 1/8" thick plated steel; Trunnion is a machine pivot of plated steel with a 5/16" rod
SEALS: Stainless steel at jambs
SCREEN: 1/2" x .051" flattened aluminum birdscreen, exterior mounted
FINISH: Mill

OPTIONS

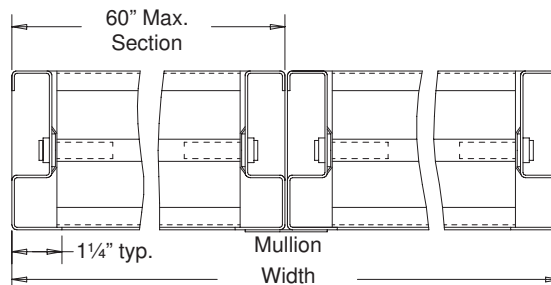
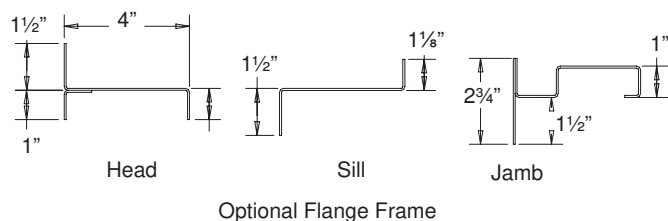
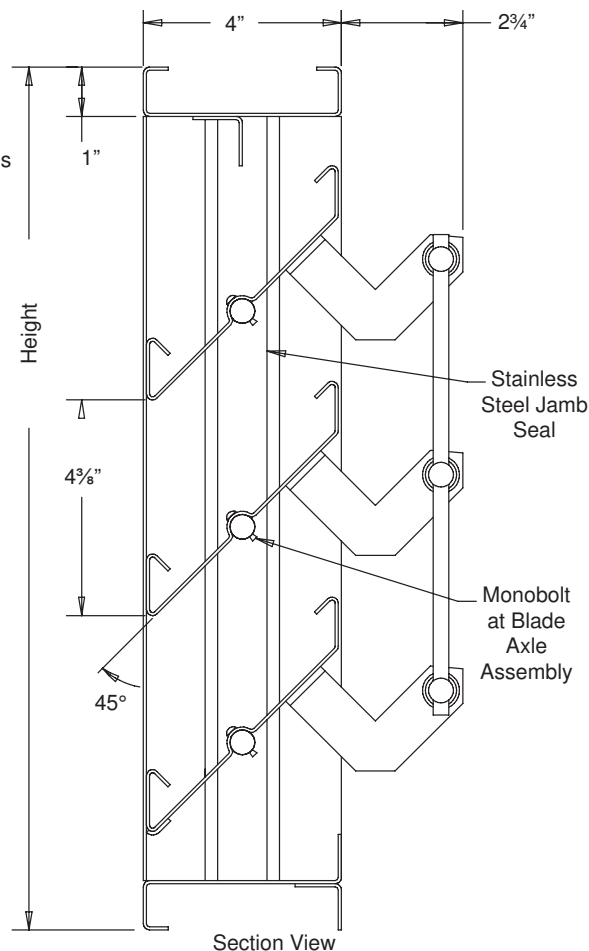
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen (Interior or Exterior)
 Deeper Frames for Blade Rotation Greater than 45°
 Neoprene Blade Edge Seals
 Other Gauges and Materials (Stainless Steel, Copper, Aluminum)
 Flange Frame
 Blank-off Panels

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 7.5 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
S445A	12"W x 12"H	60"W x 96"H



air balance

Dampers  Louvers
 UL Life Safety Products
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 Member of AMCA

MODEL S445A

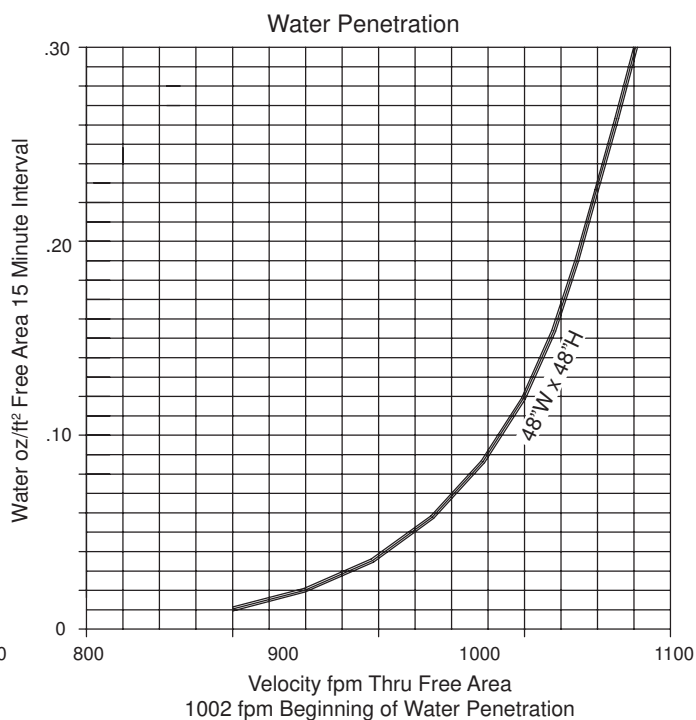
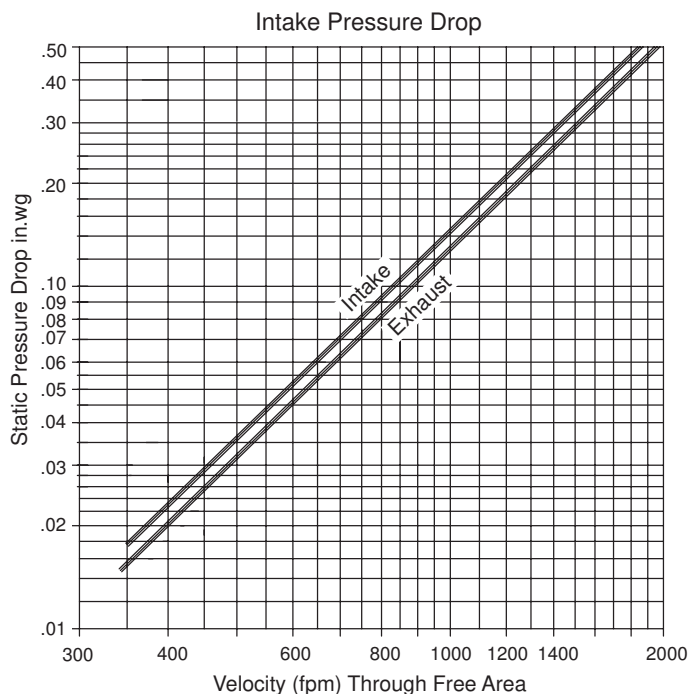
4" Deep • 45° Drainable Blade • Formed Steel Louver

Water Penetration: 950 fpm recommended maximum free area velocity

Pressure Drop: 0.08 in.wg at 700 fpm and 4921 scfm

Free Area: 7.03 sq.ft. = 43.9% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.



Free Area sq.ft.

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.21	0.34	0.47	0.6	0.73	0.86	0.99	1.12	1.25
	24"	0.63	1.03	1.43	1.83	2.23	2.63	3.03	3.34	3.83
	36"	1.08	1.76	2.45	3.13	3.81	4.50	5.18	5.86	6.54
	48"	1.70	2.40	3.33	4.26	5.19	6.12	7.03	7.98	8.91
	60"	1.85	3.01	4.18	5.35	6.61	7.68	8.84	10.01	11.18
	72"	2.28	3.72	5.16	6.60	8.04	9.48	10.92	12.36	13.80
	84"	2.73	4.45	6.18	7.90	9.62	11.35	13.07	14.79	16.52
	96"	3.11	5.08	7.04	9.00	10.97	12.93	14.90	16.86	18.83

air balance

Dampers  Louvers
UL Life Safety Products
Division of Mestek
Member of AMCA

MODEL S455A

4" Deep • Straight Blade • Formed Steel Louver

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 18-GA galvanized steel
BLADES: 18-GA galvanized steel
ASSEMBLY: Welded and/or riveted for maximum service
AXLES: 1/2" dia. extruded aluminum pin-lock rod with double-sealed bearings
LINKAGE: Sealed in one jamb out of the airstream up to 48" wide, concealed in both jambs 48" to 60" in width
SEALS: Stainless steel at jambs
SCREEN: 1/2" x .051" flattened aluminum birdscreen
FINISH: Mill

OPTIONS

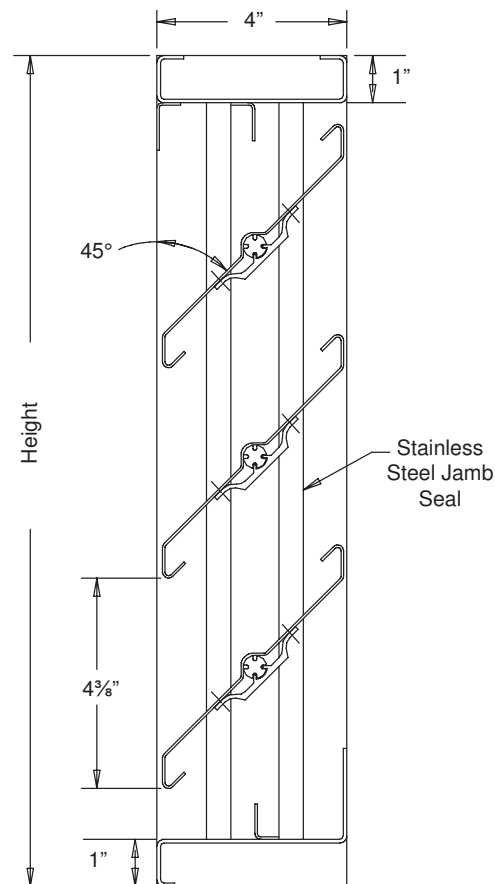
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen (Interior or Exterior)
 Deeper Frames for Blade Rotation Greater than 45°
 Neoprene Blade Edge Seals
 Other Gauges and Materials (Stainless Steel, Copper, Aluminum)
 Flange Frame
 Blank-off Panels

NOTES

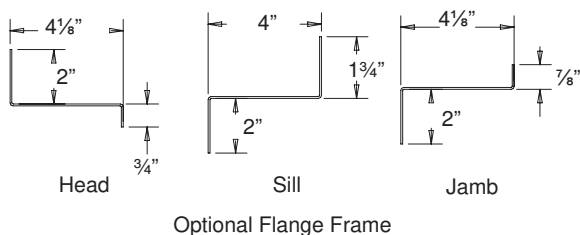
1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.
2. Shipping weight approximately 11 lbs./sq.ft.

LOUVER SIZES

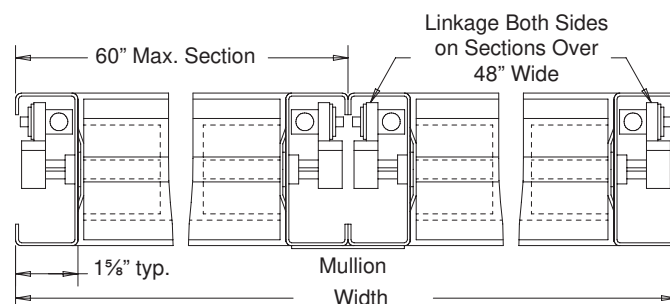
Panels	Min Panel	Max Single Panel
S455A	12"W x 12"H	60"W x 96"H



Section View



Optional Flange Frame



air balance

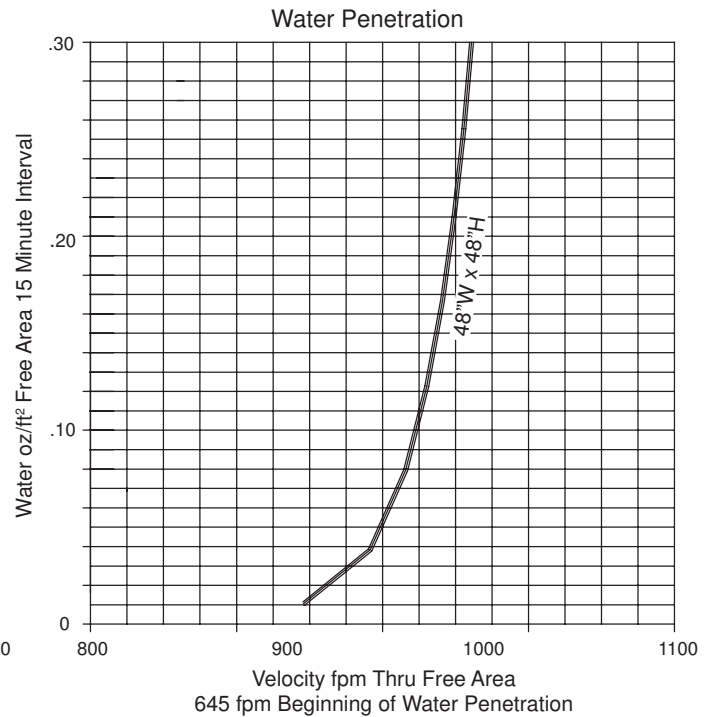
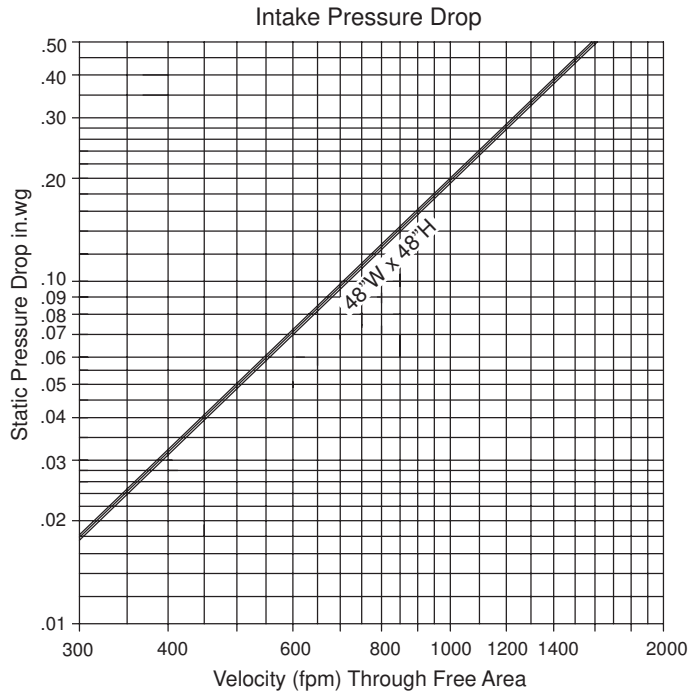
Dampers  Louvers
 UL Life Safety Products
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MODEL S455A

4" Deep • Straight Blade • Formed Steel Louver

Water Penetration: 600 fpm recommended maximum free area velocity
 Pressure Drop: 0.20 in.wg at 1000 fpm and 4870 scfm
 Free Area: 7.79 sq.ft. = 48.7% for 48"W x 48"H test size

Ratings do not include the effect of birdscreen.



Free Area sq.ft.

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	12"	0.25	0.39	0.54	0.69	0.84	0.99	1.13	1.28	1.43
	24"	0.72	1.15	1.59	2.02	2.45	2.89	3.32	3.75	4.18
	36"	1.24	1.98	2.72	3.47	4.21	4.95	5.70	6.44	7.18
	48"	1.69	2.71	3.73	4.74	5.76	6.78	7.79	8.81	9.82
	60"	2.13	3.41	4.69	5.97	7.25	8.53	9.81	11.09	12.37
	72"	2.62	4.19	5.76	7.33	8.90	10.47	12.04	13.61	15.18
	84"	3.13	5.01	6.89	8.77	10.65	12.53	14.41	16.29	18.17
	96"	3.58	5.73	7.88	10.02	12.17	14.32	16.47	18.62	20.76

air balance

Dampers  Louvers
 UL Life Safety Products
 Division of Mestek
 Member of AMCA

MODEL S645A

6" Deep • Drainable Blade • Adjustable Formed Steel Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 18-GA galvanized steel**BLADES:** 18-GA galvanized steel; Open to 45°**CONSTRUCTION:** Welded and/or riveted for maximum service**LINKAGE:** Concealed in one jamb out of the airstream up to 48" in width**FACE OF LOUVER:** Full width sill with drain head with blades contained within the jambs**LINKAGE:** Concealed in one jamb out of the airstream up to 48" in width**SEALS:** Stainless steel jamb seals**SHAFT:** .50 dia. aluminum "Pin-Lock" Rod**SCREEN:** (When indicated) specify interior or exterior - 1/2" sq. mesh, 19-GA galvanized steel .041**FINISH:** Mill**OPTIONS**

Frame and blades of other gauges

Neoprene blade edge seals.

Other material (Stainless Steel, Copper, Aluminum etc.)

Finishes: Baked powder, Epoxies, etc.

Assorted Bird and Insect Screens

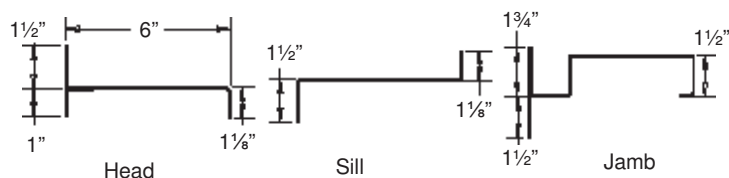
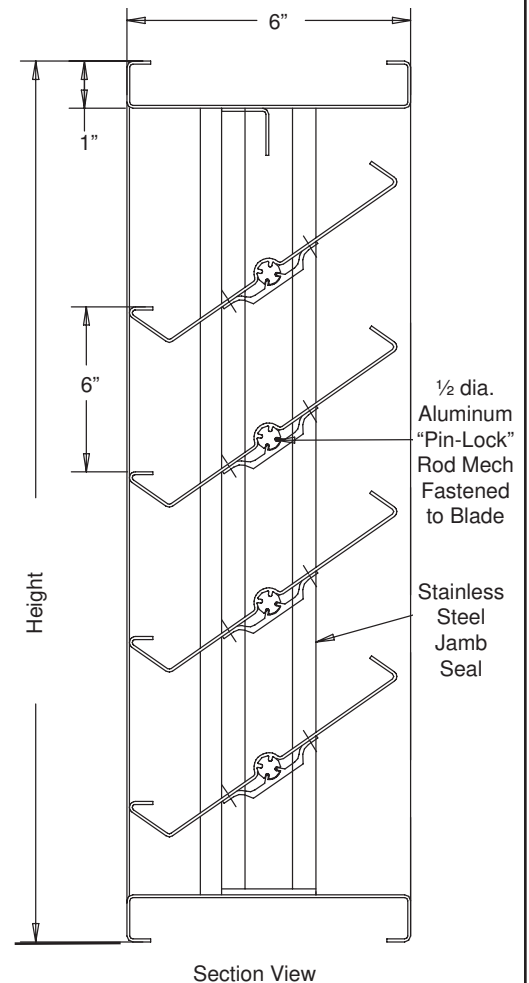
NOTES

1. 1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.

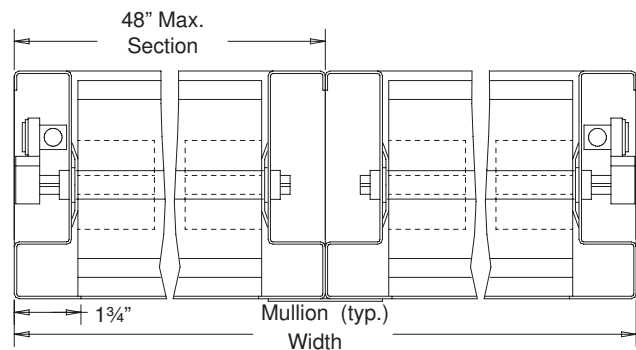
2. Shipping weight approximately 8.0 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
S645A	12"W x 12"H	48"W x 96"H



Optional Flange Frame



air balance

Dampers  Louvers
UL Life Safety Products
Division of Mestek
Member of AMCA

MODEL S645A

6" Deep • Drainable Blade • Adjustable Formed Steel Louver

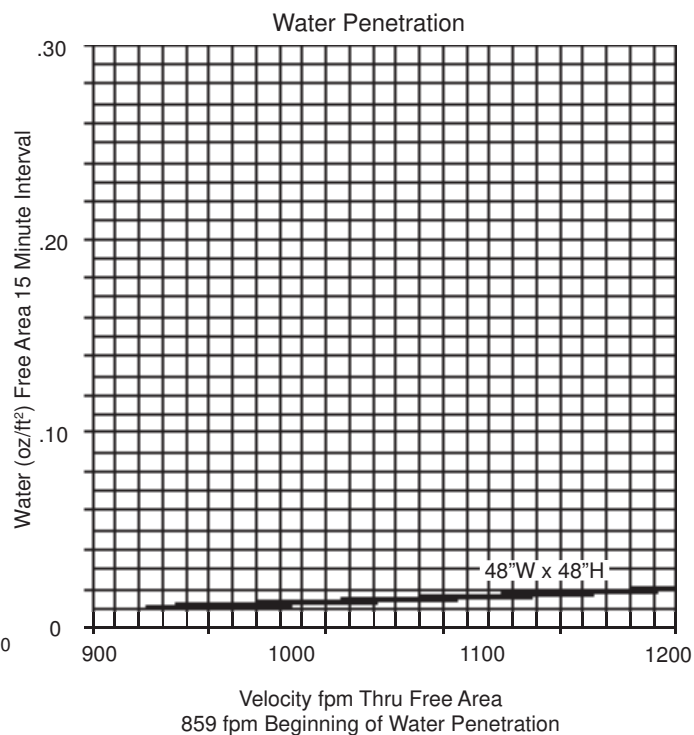
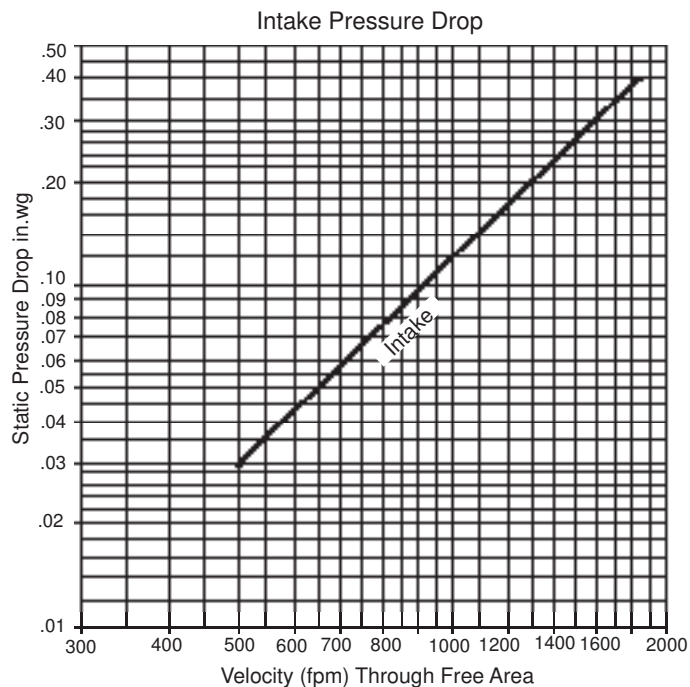
Performance Data

Less water penetration because rain runs along blade troughs, (rather than down the face of the louver), then down hidden vertical runways within the jambs.

Tests of 48" X 48" sample by an AMCA registered laboratory according to AMCA Standard 500 shows low water penetration.

Test show less than .02 oz per sq. ft. water penetration at 1200 fpm (free area Velocity) with less than .18" w.g. pressure drop (intake).

Ratings do not include effects of birdscreen.



		Free Area sq.ft.								
		Width								
Height		12"	18"	24"	30"	36"	42"	48"	54"	60"
	12"	0.31	0.51	0.71	0.91	1.1	1.3	1.5	1.66	1.89
	24"	0.75	1.21	1.67	2.14	2.61	3.07	3.54	4.01	4.47
	36"	1.27	2.05	2.84	3.64	4.43	5.23	6.02	6.81	7.61
	48"	1.73	2.90	4.02	5.14	6.26	7.38	8.50	9.62	10.74
	60"	2.23	3.59	4.98	6.37	7.76	9.15	10.54	11.93	13.32
	72"	2.72	4.44	6.15	7.87	9.58	11.30	13.02	14.74	16.46
	84"	3.19	5.13	7.12	9.10	11.09	13.08	15.06	17.05	19.04
	96"	3.71	5.98	8.29	10.60	12.92	15.23	17.54	19.86	22.17

MODEL S695

6" Deep • Insulated Blade • Formed Steel Louver

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 6" wide, 16-GA galvanized steel channel provides greater strength and rigidity
- BLADES:** 18-GA galvanized steel, double-thickness
- INSULATION:** 1½" thick with styrofoam insulation sandwiched between metal skins, mechanically fastened together on 6" C-C standard spacing
- ASSEMBLY:** Mechanically Fastened
- AXLES:** ½" dia. cadmium plated steel stub
- BEARINGS:** Oilite bronze
- LINKAGE:** Concealed in channel, out of airstream
- SEALS:** Polyurethane
- SCREEN:** ½" x .051" flattened galvanized steel birdscreen
- DRIVESHAFT:** ½" dia. cadmium plated steel permanently extended 6" beyond frame for external drive; For internal drive a blade clip will be provided
- FINISH:** Mill

OPTIONS

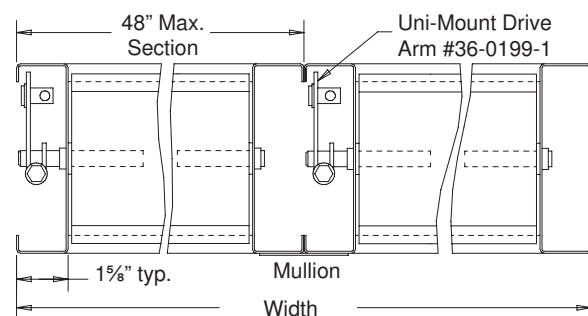
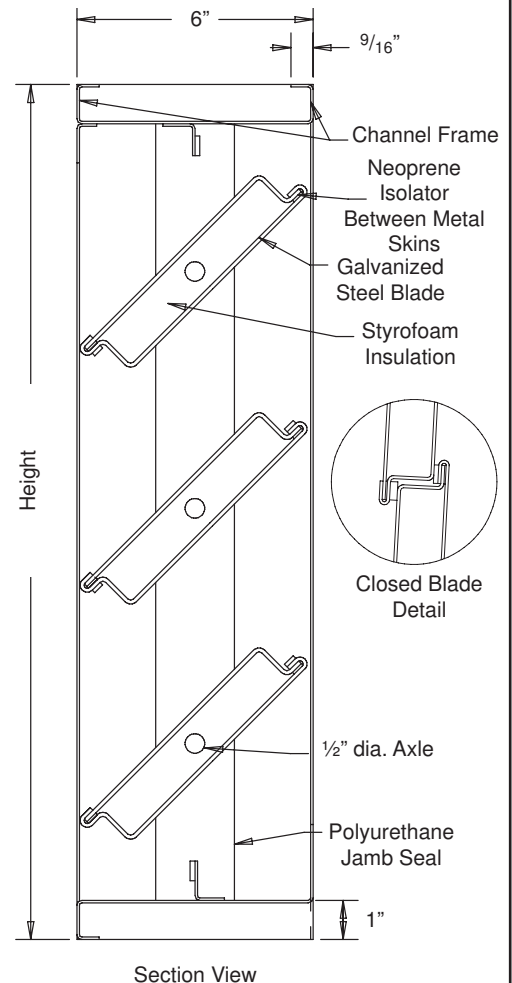
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen (Interior or Exterior)
 Stainless Steel Jamb Seals
 Other Gauges and Materials (Stainless Steel, Copper, Aluminum)
 Flange Frame
 Blank-off Panels

NOTES

- "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undercut.
- Insulating factors for louver:
 $R\text{-Value} = 4$
 $U\text{-Factor} = .25 \text{ btu per hour per square foot per degree F.}$
 The above values are based on calculations considering the face area of the damper only. This does not include frames. Insulation of damper frame shall be by others
- Shipping weight approximately 7 lbs./sq.ft.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
S695	12"W x 12"H	60"W x 72"H



air balance

Dampers  Louvers
 UL Life Safety Products
 Division of Mestek
 Member of AMCA

MODEL S695

6" Deep • Insulated Blade • Formed Steel Louver

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MODEL S735C

7" Deep • Drainable Blade • Combination Stationary & Adjustable • Formed Steel Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 18-GA galvanized steel**BLADES:** Adjustable blades are 16-GA galvanized steel
Stationary blades are 18-GA galvanized steel**FACE OF LOUVER:** Full width sill with drain head with blades contained within the jambs**LINKAGE:** Brackets are 12-GA zinc plated steel, pivots are .050" dia. machined steel. Zinc plated pivots rotate in a Celcon bearing. A .312 dia. aluminum linkage rod is locked to the pivot by a 1/4 - 20 set screw with an epoxy locking patch.**SEALS:** Dual Durometer Vinyl-Grip seals at blade edge, neoprene at jambs**SHAFT:** 1/2" dia. plated steel stub**SCREEN:** Secured to the exterior
1/2" Sq. mesh 19 ga. galvanized steel (.041")
19-GA galvanized steel .041**FINISH:** Mill**OPTIONS**

Frame and blades of other gauges

Neoprene blade edge seals

Other material (Stainless Steel, Copper, Aluminum etc.)

Finishes: Baked powder, Epoxies, etc.

Assorted Bird and Insect Screens

Electric Actuators

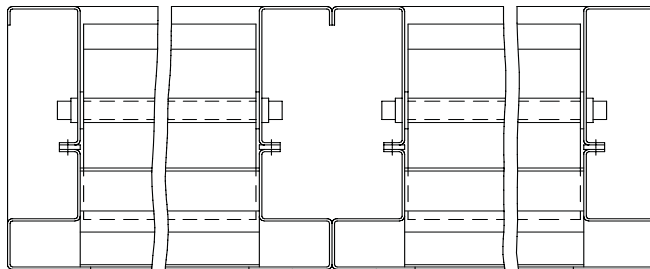
NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately 1/2" undercut.

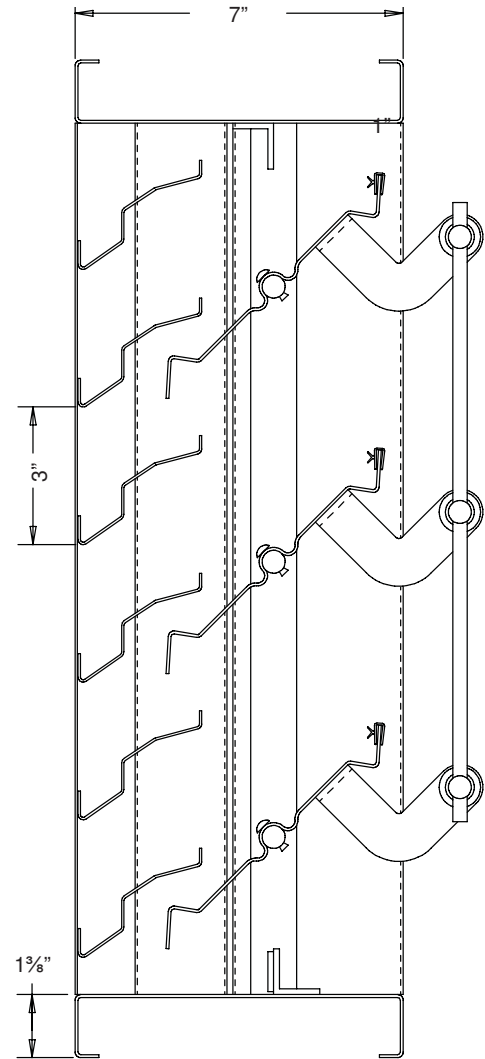
2. Shipping weight approximately 9.0 lbs./sq.ft.

LOUVER SIZES

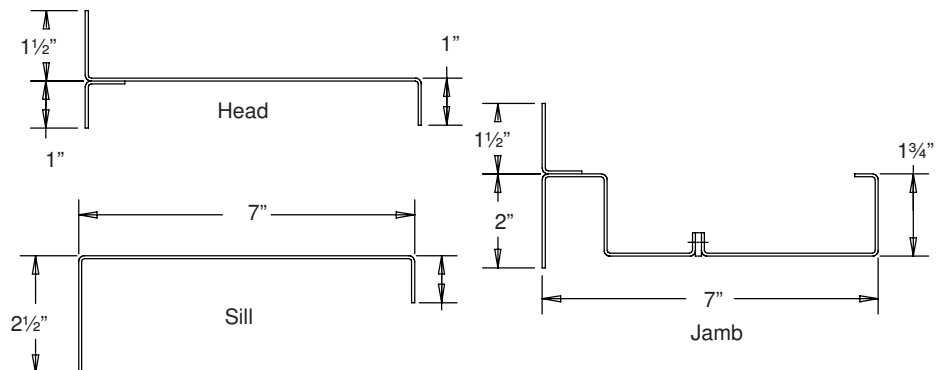
Panels	Min Panel	Max Single Panel
S735C	12"W x 19"H	48"W x 96"H



Mullion (typ.)



Section View

**air balance**

Dampers  Louvers
UL Life Safety Products
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Member of AMCA

MODEL S735C

7" Deep • Drainable Blade • Combination Stationary & Adjustable • Formed Steel Louver

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Acoustical Louvers

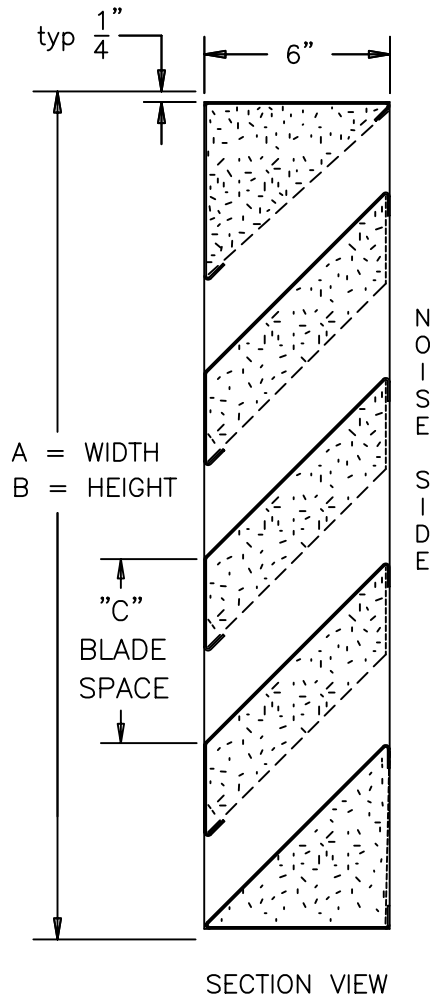
- AAC66 — 6" Deep, 6" Blade Spacing, Aluminum Louver
- AAC86 — 8" Deep, 6" Blade Spacing, Aluminum Louver
- AAC88 — 8" Deep, 8" Blade Spacing, Aluminum Louver
- AAC126 — 12" Deep, 6" Blade Spacing, Aluminum Louver
- AAC129 — 12" Deep, 9" Blade Spacing, Aluminum Louver
- AAC1212 — 12" Deep, 12" Blade Spacing, Aluminum Louver
- AAC1215 — 12" Deep, 15" Blade Spacing, Aluminum Louver
- AAC12AF — 12" Deep, Airfoil Blade, Aluminum Louver
- AAC47 — 4" Deep, Formed Steel Louver
- GAC66 — 6" Deep, 6" Blade Spacing, Steel Louver
- GAC86 — 8" Deep, 6" Blade Spacing, Steel Louver
- GAC88 — 8" Deep, 8" Blade Spacing, Steel Louver
- GAC126 — 12" Deep, 6" Blade Spacing, Steel Louver
- GAC129 — 12" Deep, 9" Blade Spacing, Steel Louver
- GAC1212 — 12" Deep, 12" Blade Spacing, Steel Louver
- GAC1215 — 12" Deep, 15" Blade Spacing, Steel Louver
- GAC12AF — 12" Deep, Airfoil Blade, Steel Louver
- AAC73A — 7" Deep, Stationary and Adjustable Insulated Blade, Steel Louver

air balance

Dampers  Louvers
UL Life Safety Products

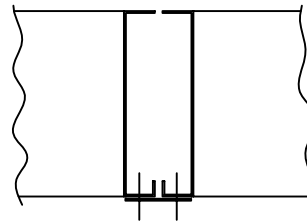
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FABRICATED ALUMINUM, 6" DEEP, HEAVY GAUGE, ACOUSTICAL FIXED TYPE BLADE



MODEL AAC-66 STANDARD SPECIFICATIONS

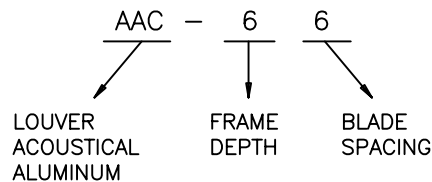
- FRAME: 6" DEEP, 12 GAUGE ALUMINUM.
- BLADES: 16 GAUGE ALUMINUM (NON NOISE SIDE).
20 GAUGE PERFORATED ALUMINUM (NOISE SIDE)
- INSULATION: WATER RESISTANT SOUND ABSORBING MATERIAL
- FINISH: MILL.
- SCREEN: $\frac{1}{2}$ " REMOVABLE EXPANDED ALUMINUM BIRD SCREEN, LOCATED ON INTERIOR (NOISE SIDE).
- MAXIMUM PANEL SIZE: 72" X 96".
- MINIMUM PANEL SIZE: 12" X 15".
- DIMENSIONS: "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING SIZES. LOUVERS ARE MADE $\frac{1}{2}$ " UNDERSIZE.



STANDARD VERTICAL
MULLION

MODEL No.	"C" BLADE SPACE
AAC-66	6"

LOUVER MODEL No. DESCRIPTION



STC CLASS 12

OCTAVE BAND	1	2	3	4	5	6	7	8
FREQUENCY (Hz)	63	125	250	500	1K	2K	4K	8K
TRANSMISSION LOSS (db)	1	6	6	9	13	15	14	14
FREE FIELD NOISE REDUCTION (db)	7	12	12	15	19	21	20	20

abi air balance

A MESTEK COMPANY

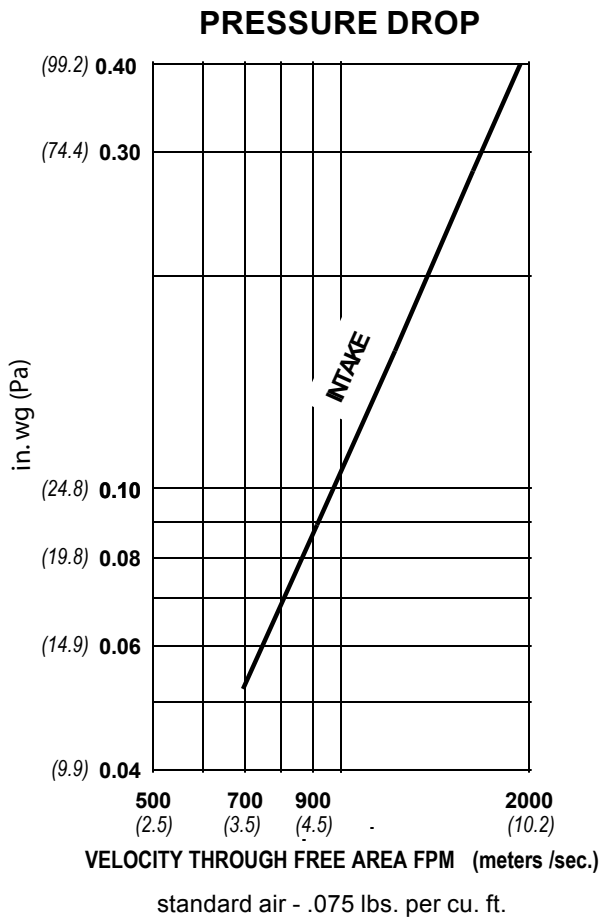
7435 INDUSTRIAL RD
Phone (419) 865-5000

FLORENCE, KY
Fax (419) 865-1375

AAC-66 ACOUSTICAL LOUVER

DRN. BY ESS	DWG. NO. AAC-66	REV.
DATE 01-10-03		

Water Penetration : .01 oz. (3.0 g) at 858 fpm (4.36 m/s) recommended free area velocity
Pressure Drop : .076 in. wg. (18.8 Pa.) at 858 fpm (4.36 m/s) and 3460 SCFM (1.63 scm/s)
Free Area



This product was tested in accordance with AMCA Standard 500L.

Below is an explanation of how to use the AMCA performance data for the recommended free area velocity of 858 (4.36 m/s).

To determine minimum free area required for louver:

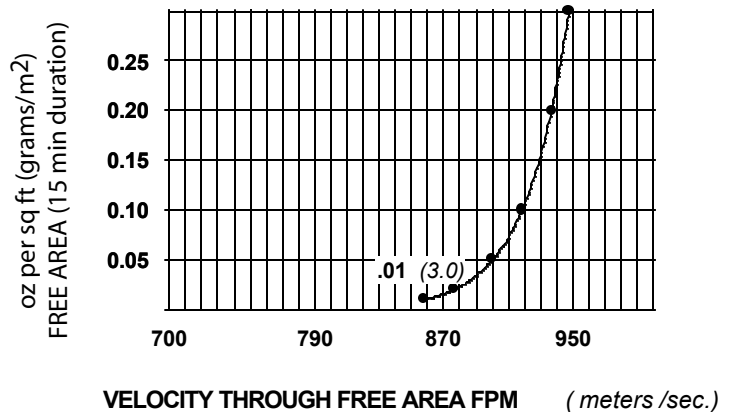
Step #1: Divide the required CFM flow by the maximum recommended free area velocity.

Step #2: Select the most desirable louver size, from the free area table, that meets the minimum free area requirement.

Step #3: Compare specified performance to the certified water penetration and pressure drop ratings.

FREE AREA IN SQUARE FEET (sq. meters)

HEIGHT	WIDTH										
	in.	12	24	30	36	42	48	54	60	66	72
	mm	304	609	762	914	1066	1219	1371	1524	1676	1828
20	0.26	0.58	0.74	0.89	1.05	1.21	1.37	1.52	1.68	1.84	
508	0.02	0.05	0.07	0.08	0.10	0.11	0.13	0.14	0.16	0.17	
24	0.39	0.87	1.10	1.34	1.58	1.81	2.05	2.29	2.52	2.76	
609	0.04	0.08	0.10	0.12	0.15	0.17	0.19	0.21	0.23	0.26	
36	0.66	1.45	1.84	2.23	2.63	3.02	3.42	3.81	4.21	4.60	
914	0.06	0.13	0.17	0.21	0.24	0.28	0.32	0.35	0.39	0.43	
48	0.92	2.02	2.58	3.13	3.68	4.23	4.78	5.34	5.89	6.44	
1219	0.09	0.19	0.24	0.29	0.34	0.39	0.44	0.50	0.55	0.60	
60	1.18	2.60	3.31	4.02	4.73	5.44	6.15	6.86	7.57	8.28	
1524	0.11	0.24	0.31	0.37	0.44	0.51	0.57	0.64	0.70	0.77	
72	1.45	3.18	4.05	4.92	5.78	6.65	7.52	8.39	9.25	10.12	
1828	0.13	0.30	0.38	0.46	0.54	0.62	0.70	0.78	0.86	0.94	
84	1.71	3.76	4.78	5.81	6.84	7.86	8.89	9.91	10.94	11.96	
2133	0.16	0.35	0.44	0.54	0.64	0.73	0.83	0.92	1.02	1.11	
96	1.97	4.34	5.52	6.70	7.89	9.07	10.25	11.44	12.62	13.80	
2438	0.18	0.40	0.51	0.62	0.73	0.84	0.95	1.06	1.17	1.28	



Both maximum recommended free area velocity and beginning of water penetration are **858 fpm** at standard air - .075 lbs. per cu. ft. The above water penetration data is based on mill finish, 48" x 48" test size per AMCA Standard 511.

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height with a single panel. Unusually high wind loading may require structural supports on non-multiple wide and multiple high assemblies. **Structural supports and mounting accessories are not supplied as a standard.**

Example: Given 5,000 CFM design flow

Step #1:

$$\text{min. free area} = \frac{\text{Design CFM}}{\text{Max. Recommended Velocity}} = \frac{5,000}{858} = 5.83 \text{ sq. ft.}$$

Step #2: From the free area table above the approximate louver size is **54" x 60"** = (6.15 sq. ft.)

FABRICATED ALUMINUM, 8" DEEP, HEAVY GAUGE, ACOUSTICAL FIXED TYPE BLADE

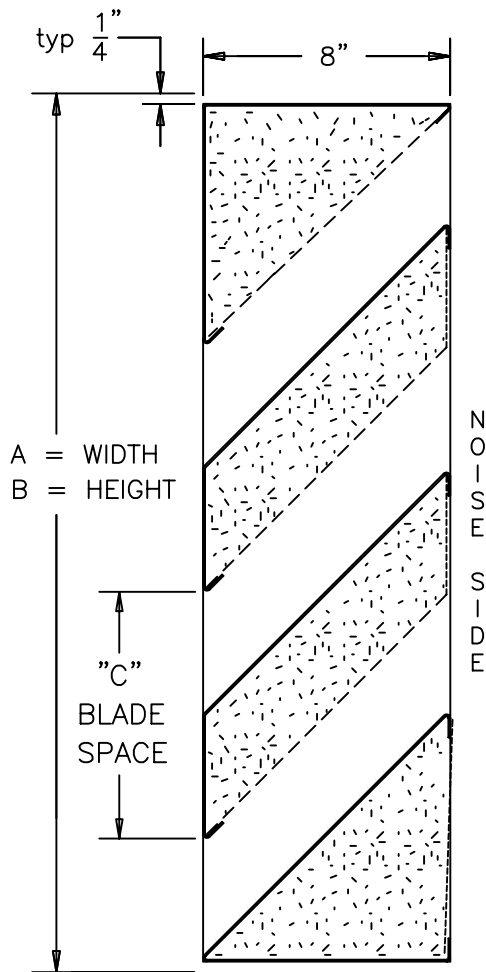
MODEL AAC-86 STANDARD SPECIFICATIONS

FRAME: 8" DEEP, 12 GAUGE ALUMINUM.
 BLADES: 16 GAUGE ALUMINUM (NON NOISE SIDE).
 20 GAUGE PERFORATED ALUMINUM (NOISE SIDE)
 INSULATION: WATER RESISTANT SOUND ABSORBING MATERIAL
 FINISH: MILL.
 SCREEN: 1/2" REMOVABLE EXPANDED ALUMINUM BIRD
 SCREEN, LOCATED ON INTERIOR (NOISE SIDE).

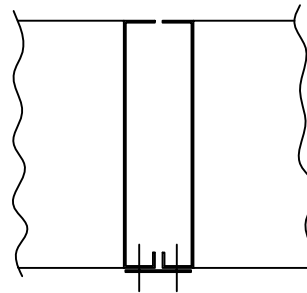
MAXIMUM PANEL SIZE: 72" X 96".

MINIMUM PANEL SIZE: 12" X 17".

DIMENSIONS: "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING
 SIZES. LOUVERS ARE MADE 1/2" UNDERSIZE.



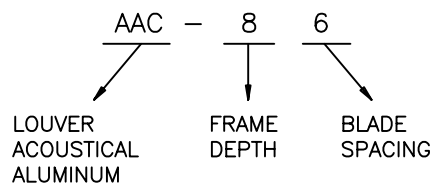
SECTION VIEW



STANDARD VERTICAL
MULLION

MODEL No.	"C" BLADE SPACE
AAC-86	6"

LOUVER MODEL No. DESCRIPTION

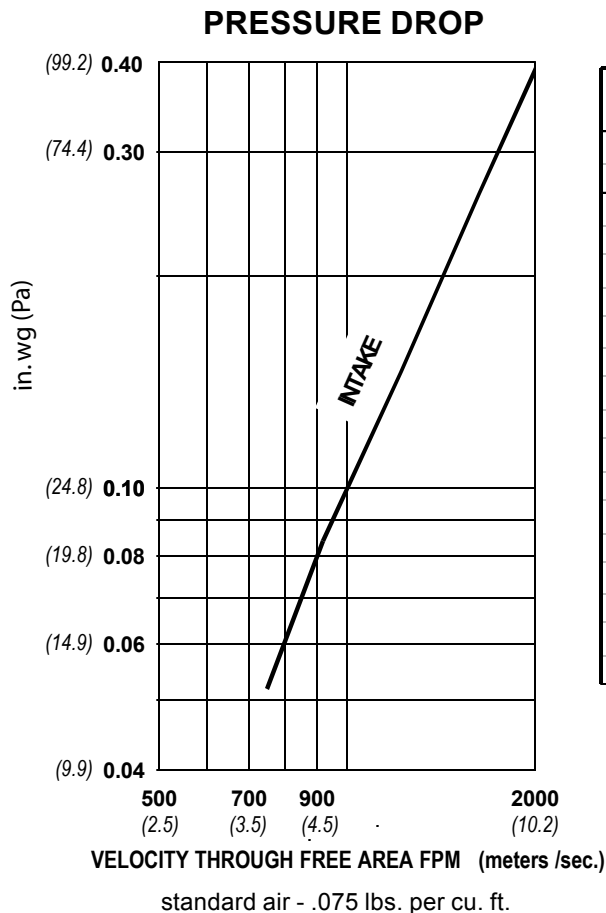


STC CLASS 14

OCTAVE BAND	1	2	3	4	5	6	7	8
FREQUENCY (Hz)	63	125	250	500	1K	2K	4K	8K
TRANSMISSION LOSS (db)	1	4	5	9	16	19	16	13
FREE FIELD NOISE REDUCTION (db)	7	10	11	15	22	25	22	19

abi air balance A MESTEK COMPANY 7435 INDUSTRIAL RD FLORENCE, KY Phone (419) 865-5000 Fax (419) 865-1375			AAC-86 ACOUSTICAL LOUVER		
DRN. BY	ESS	DWG. NO.	AAC-86		REV.
DATE	12-18-00				

Pressure Drop : .099 in. wg. (24.5 Pa.) at 990 fpm (5.03 m/s) and 3990 SCFM (1.88 scm/s)
Free Area

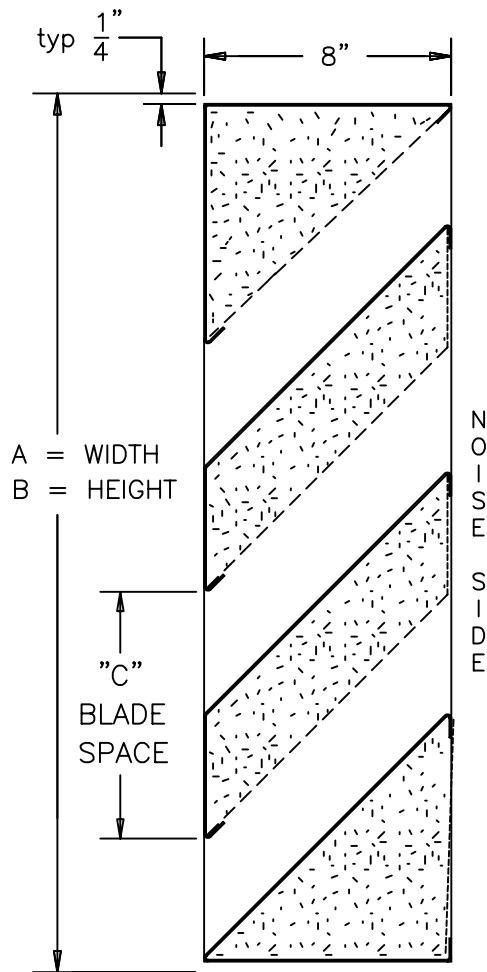


FREE AREA IN SQUARE FEET (sq. meters)									
		WIDTH							
	in.	12	24	30	36	42	48	54	60
	mm	304	609	762	914	1066	1219	1371	1524
HEIGHT	20	0.23	0.51	0.65	0.79	0.94	1.08	1.22	1.36
	508	0.02	0.05	0.06	0.07	0.09	0.10	0.11	0.13
	24	0.36	0.81	1.03	1.26	1.49	1.71	1.94	2.16
	609	0.03	0.08	0.10	0.12	0.14	0.16	0.18	0.20
	36	0.69	1.55	1.99	2.42	2.86	3.29	3.72	4.16
	914	0.06	0.14	0.18	0.23	0.27	0.31	0.35	0.39
	48	0.88	2.00	2.56	3.12	3.68	4.24	4.80	5.36
	1219	0.08	0.19	0.24	0.29	0.34	0.39	0.45	0.50
	60	1.15	2.60	3.33	4.05	4.78	5.50	6.23	6.95
	1524	0.11	0.24	0.31	0.38	0.44	0.51	0.58	0.65
	72	1.41	3.20	4.09	4.98	5.87	6.77	7.66	8.55
	1828	0.13	0.30	0.38	0.46	0.55	0.63	0.71	0.79
84	1.68	3.79	4.85	5.91	6.97	8.03	9.09	10.15	
2133	0.16	0.35	0.45	0.55	0.65	0.75	0.84	0.94	
96	1.94	4.39	5.62	6.84	8.07	9.29	10.52	11.75	
2438	0.18	0.41	0.52	0.64	0.75	0.86	0.98	1.09	

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height with a single panel. Unusually high wind loading may require assemblies. **Structural supports and mounting accessories are not supplied as a standard.**

AAC-86 Acoustical Louver

FABRICATED ALUMINUM, 8" DEEP, HEAVY GAUGE, ACOUSTICAL FIXED TYPE BLADE



SECTION VIEW

MODEL AAC-88
STANDARD SPECIFICATIONS

FRAME: 8" DEEP, 12 GAUGE ALUMINUM.

BLADES: 16 GAUGE ALUMINUM (NON NOISE SIDE).
20 GAUGE PERFORATED ALUMINUM (NOISE SIDE)

INSULATION: WATER RESISTANT SOUND ABSORBING MATERIAL

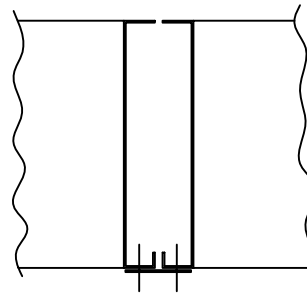
FINISH: MILL.

SCREEN: 1/2" REMOVABLE EXPANDED ALUMINUM BIRD SCREEN, LOCATED ON INTERIOR (NOISE SIDE).

MAXIMUM PANEL SIZE: 72" X 96".

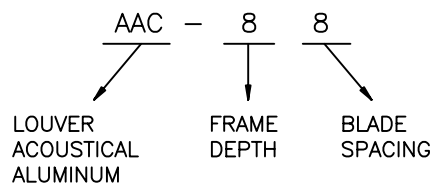
MINIMUM PANEL SIZE: 12" X 20".

DIMENSIONS: "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING SIZES. LOUVERS ARE MADE 1/2" UNDERSIZE.

STANDARD VERTICAL
MULLION

MODEL No.	"C" BLADE SPACE
AAC-88	8"

LOUVER MODEL No. DESCRIPTION

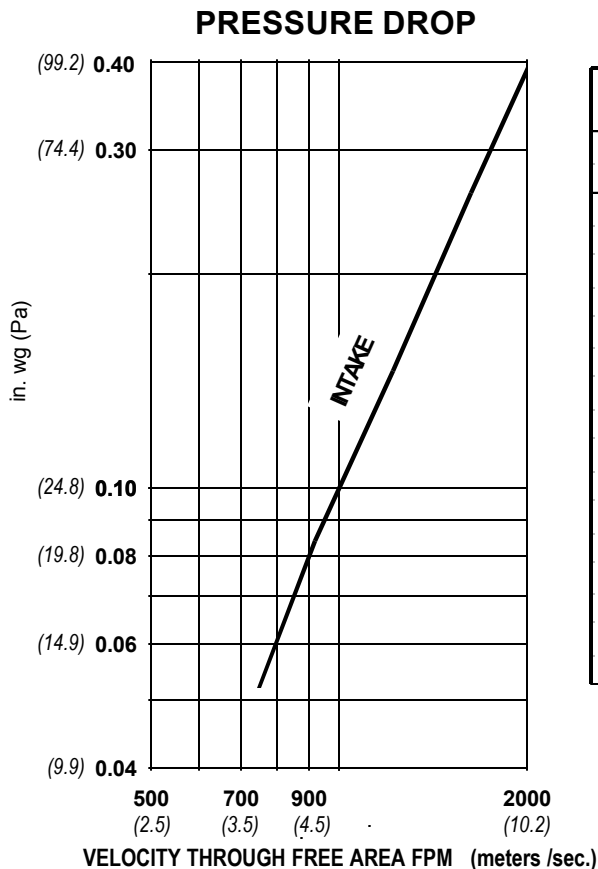


STC CLASS 12

OCTAVE BAND	1	2	3	4	5	6	7	8
FREQUENCY (Hz)	63	125	250	500	1K	2K	4K	8K
TRANSMISSION LOSS (db)	1	5	6	9	13	16	13	11
FREE FIELD NOISE REDUCTION (db)	7	11	12	15	19	22	19	17

abi [®] air balance A MESTEK COMPANY		
7435 INDUSTRIAL RD Phone (859) 538-3400		FLORENCE, KY Fax (859) 647-7810
AAC-88 ACOUSTICAL LOUVER		
DRN. BY ESS	DWG. NO. AAC-88	REV.
DATE 10-04-06		

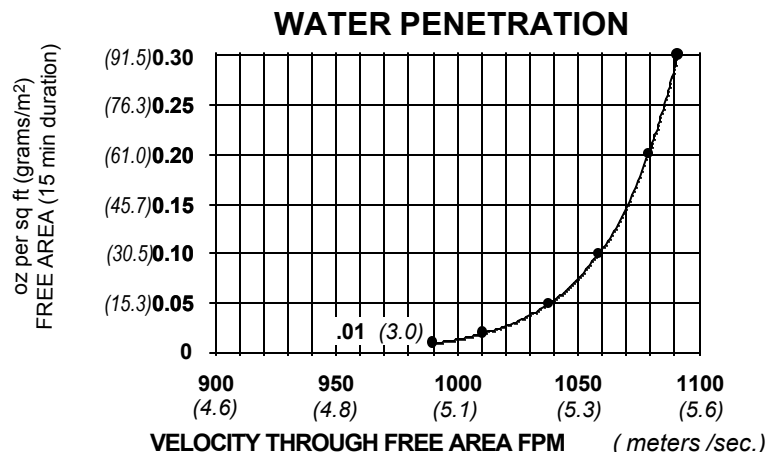
Water Penetration : .01 oz. (3.0 g.) at 990 fpm (5.03 m/s) recommended free area velocity
Pressure Drop
Free Area : 4.03 sq.ft. (0.374 sq. m.) = 25% for 48" x 48" (1.22 m x 1.22 m) test size



standard air - .075 lbs. per cu. ft.
Ratings do not include the effect of a bird screen

This product was tested in accordance
with AMCA Standard 500L.

FREE AREA IN SQUARE FEET (sq. meters)									
		WIDTH							
	in.	12	24	30	36	42	48	54	60
	mm	304	609	762	914	1066	1219	1371	1524
HEIGHT	20	0.31	0.69	0.88	1.08	1.27	1.46	1.66	1.85
	508	0.03	0.06	0.08	0.10	0.12	0.14	0.15	0.17
	24	0.31	0.69	0.88	1.08	1.27	1.46	1.66	1.85
	609	0.03	0.06	0.08	0.10	0.12	0.14	0.15	0.17
	36	0.66	1.50	1.92	2.34	2.76	3.18	3.60	4.02
	914	0.06	0.14	0.18	0.22	0.26	0.30	0.33	0.37
	48	0.84	1.90	2.43	2.97	3.50	4.03	4.56	5.09
	1219	0.08	0.18	0.23	0.28	0.32	0.37	0.42	0.47
	60	1.20	2.72	3.48	4.24	4.99	5.75	6.51	7.27
	1524	0.11	0.25	0.32	0.39	0.46	0.53	0.61	0.68
	72	1.38	3.12	4.00	4.87	5.74	6.61	7.48	8.36
	1828	0.13	0.29	0.37	0.45	0.53	0.61	0.70	0.78
84	1.74	3.93	5.03	6.13	7.23	8.33	9.43	10.52	
2133	0.16	0.37	0.47	0.57	0.67	0.77	0.88	0.98	
96	1.92	4.34	5.55	6.76	7.97	9.18	10.39	11.61	
2438	0.18	0.40	0.52	0.63	0.74	0.85	0.97	1.08	



Both maximum recommended free area velocity and beginning of water penetration are **990 fpm** at standard air - .075 lbs. per cu. ft.
The above water penetration data is based on mill finish, 48" x 48" test size per AMCA Standard 511.

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height with a single panel. Unusually high wind loading may require structural supports on non-multiple wide and multiple high assemblies. **Structural supports and mounting accessories are not supplied as a standard.**

Below is an explanation of how to use the performance data for the recommended free area velocity of 990 (5.03 m/s).

To determine minimum free area required for louver:

Step #1: Divide the required CFM flow by the maximum recommended free area velocity.

Step #2: Select the most desirable louver size, from the free area table, that meets the minimum free area requirement.

Step #3: Compare specified performance to the certified water penetration and pressure drop ratings.

Example: Given 5,000 CFM design flow

Step #1:

$$\text{min. free area} = \frac{\text{Design CFM}}{\text{Max. Recommended Velocity}} = \frac{5,000}{990} = 5.05 \text{ sq. ft.}$$

Step #2: From the free area table above the approximate louver size is **60" x 48"** = (5.09 sq. ft.)

MODEL AAC126

12" Deep • 6" Blade Spacing • Aluminum Acoustical Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 14-GA aluminum
BLADE: 16-GA aluminum airfoil exterior surface with 22-GA perforated aluminum interior surface
BLADE FILL: Sound insulation
SCREEN: ½" attened aluminum mesh (.051")
FINISH: Mill

OPTIONS

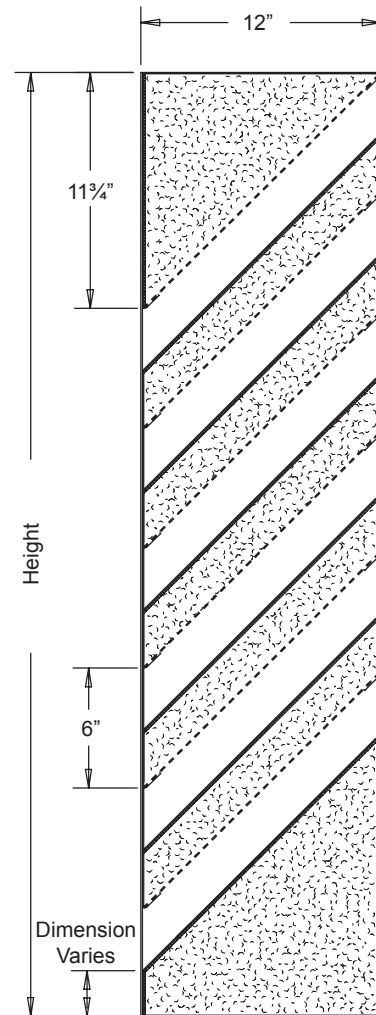
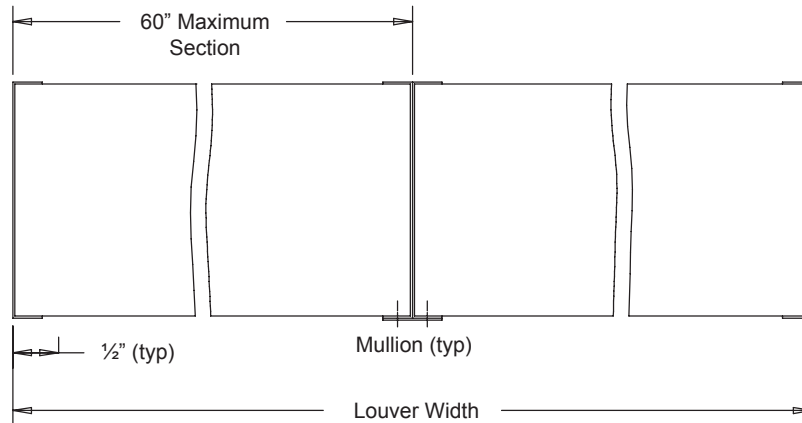
Finish - Baked Enamel, Kynar, or Anodize

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undercut.
2. Shipping louvers by commercial carrier requires at least one louver dimension not to exceed 84" in height or width.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
AAC126	12"W x 22"H	60"W x 96"H

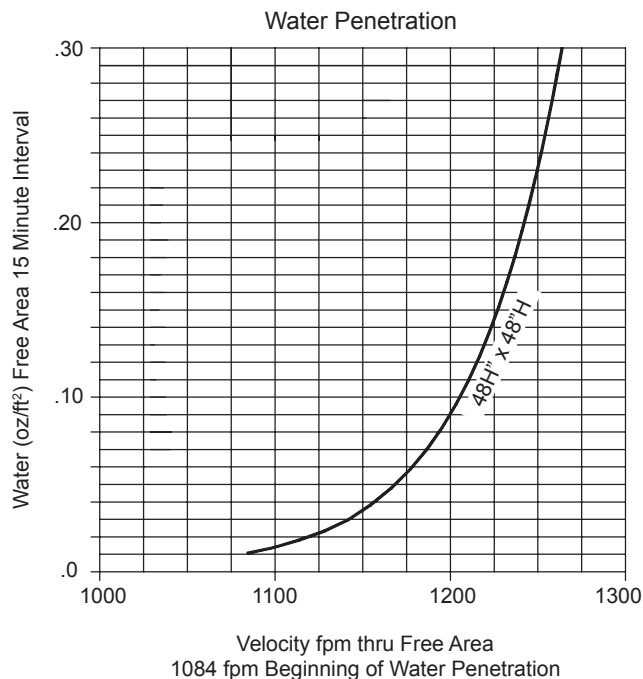
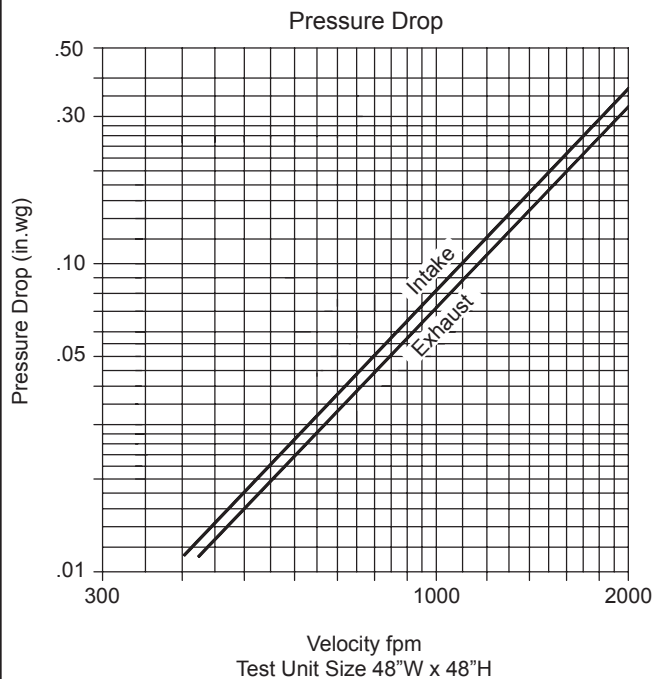


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MODEL AAC126

12" Deep • 6" Blade Spacing • Aluminum Acoustical Louver



Sound Transmission Loss

Octive Band	1	2	3	4	5	6	7	8
Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Sound Transmission Loss (db)	8	6	6	12	18	23	19	13
Free Field Noise Reduction	14	12	12	18	24	29	25	19

Attenuation

Distance From Louver	Octive Band Center Frequency (Hz)							
	1	2	3	4	5	6	7	8
	63	125	250	500	1000	2000	4000	8000
0	14	12	12	18	24	29	25	19
10	26	24	24	30	36	41	37	31
50	40	44	30	44	50	55	51	45
100	46	50	44	50	56	61	57	51
200	52	52	50	56	62	67	67	57
500	60	58	56	64	70	75	71	65
1000	66	64	64	70	76	81	77	71

The Attenuation Chart is a combination of the model AAC126 sound transmission loss and the reduction of sound energy as a function of distance.

Free Area

		Width									
Height		12	18	24	30	36	42	48	54	60	
	24	.27	.44	.62	.80	.97	1.15	1.33	1.51	1.68	
	36	.53	.89	1.24	1.59	1.95	2.30	2.66	3.01	3.36	
	48	.80	1.33	1.86	2.39	2.93	3.45	3.98	4.52	5.05	
	60	1.06	1.77	2.48	3.19	3.90	4.60	5.31	6.02	6.73	
	72	1.33	2.21	3.10	3.98	4.87	5.76	6.64	7.53	8.41	
	84	1.59	2.66	3.72	4.78	5.84	6.91	7.97	9.03	10.09	
	96	1.86	3.10	4.34	5.58	6.82	8.06	9.30	10.45	11.78	

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FABRICATED ALUMINUM, 12" DEEP, HEAVY GAUGE, ACOUSTICAL FIXED TYPE BLADE

MODEL AAC-129 STANDARD SPECIFICATIONS

FRAME: 12" DEEP, 12 GAUGE ALUMINUM.

BLADES: 16 GAUGE ALUMINUM (NON NOISE SIDE).
20 GAUGE PERFORATED ALUMINUM (NOISE SIDE).

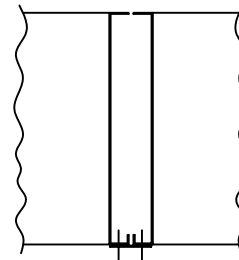
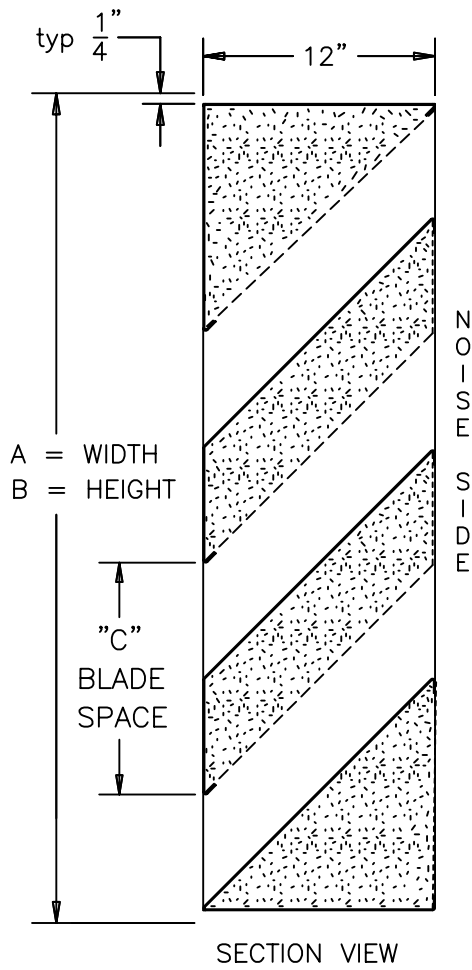
INSULATION: WATER RESISTANT SOUND ABSORBING MATERIAL

FINISH: MILL.

SCREEN: 1/2" REMOVABLE EXPANDED ALUMINUM BIRD SCREEN, LOCATED ON INTERIOR (NOISE SIDE).

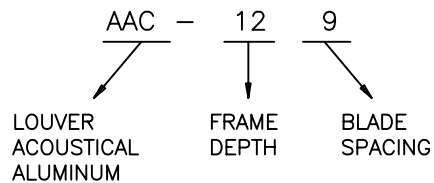
MAXIMUM PANEL SIZE : 72" x 96".
MINIMUM PANEL SIZE : 12" x 24"

DIMENSIONS: "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING SIZES. LOUVERS ARE MADE 1/2" UNDERSIZE.



MODEL No.	"C" BLADE SPACE
AAC-129	9"

LOUVER MODEL No. DESCRIPTION



STC CLASS 21

OCTAVE BAND	1	2	3	4	5	6	7	8
FREQUENCY (Hz)	63	125	250	500	1K	2K	4K	8K
TRANSMISSION LOSS (db)	2	8	12	16	23	28	25	17
FREE FIELD NOISE REDUCTION (db)	8	14	18	22	29	34	31	23

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Phone (419) 865-5000

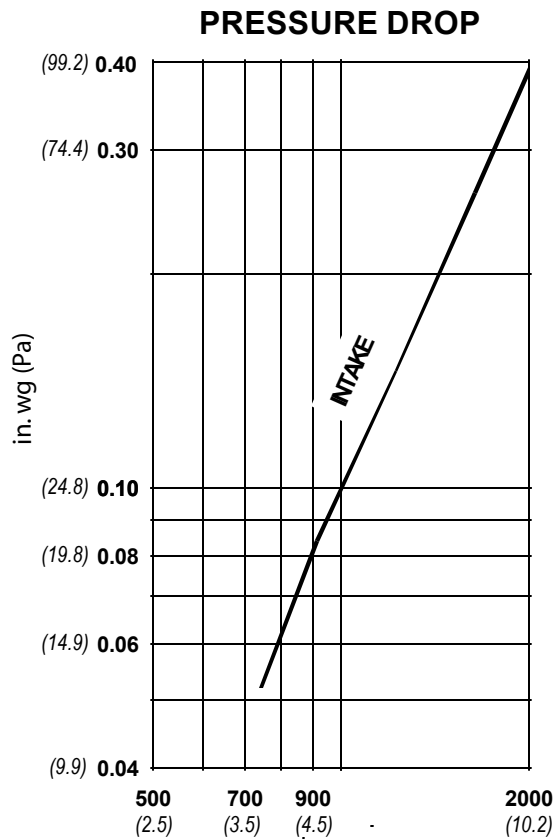
FLORENCE, KY
Fax (419) 865-1375

AAC-129 ACOUSTICAL LOUVER

DRN. BY	DWG. NO.	REV.
ESS	AAC-129	
DATE	12-19-00	

Pressure Drop

Free Area : 2.38 sq.ft. (0.221 sq. m.) = 15% for 48" x 48" (1.22 m x 1.22 m) test size



standard air - .075 lbs. per cu. ft.

FREE AREA IN SQUARE FEET (sq. meters)

		WIDTH							
HEIGHT	in.	12	24	30	36	42	48	54	60
	mm	304	609	762	914	1066	1219	1371	1524
	20	0.23	0.51	0.65	0.79	0.94	1.08	1.22	1.36
	508	0.02	0.05	0.06	0.07	0.09	0.10	0.11	0.13
	24	0.23	0.52	0.66	0.81	0.95	1.10	1.24	1.38
	609	0.02	0.05	0.06	0.07	0.09	0.10	0.12	0.13
	36	0.36	0.82	1.05	1.28	1.51	1.74	1.97	2.20
	914	0.03	0.08	0.10	0.12	0.14	0.16	0.18	0.20
	48	0.50	1.12	1.44	1.75	2.07	2.38	2.69	3.01
	1219	0.05	0.10	0.13	0.16	0.19	0.22	0.25	0.28
HEIGHT	60	0.76	1.73	2.21	2.70	3.18	3.66	4.15	4.63
	1524	0.07	0.16	0.21	0.25	0.30	0.34	0.39	0.43
	72	0.90	2.03	2.60	3.17	3.74	4.30	4.87	5.44
	1828	0.08	0.19	0.24	0.29	0.35	0.40	0.45	0.51
	84	1.03	2.34	2.99	3.64	4.29	4.95	5.60	6.25
	2133	0.10	0.22	0.28	0.34	0.40	0.46	0.52	0.58
	96	1.30	2.94	3.77	4.59	5.41	6.23	7.05	7.87
	2438	0.12	0.27	0.35	0.43	0.50	0.58	0.66	0.73

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height

structural supports on non-multiple wide and multiple high assemblies. **Structural supports and mounting accessories are not supplied as a standard.**

AAC-129 Acoustical Louver

MODEL AAC1212

12" Deep • 12" Blade Spacing • Aluminum Acoustical Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 14-GA aluminum
BLADE: 16-GA aluminum airfoil exterior surface with 22-GA perforated aluminum interior surface
BLADE FILL: Sound insulation
SCREEN: ½" attened aluminum mesh (.051")
FINISH: Mill

OPTIONS

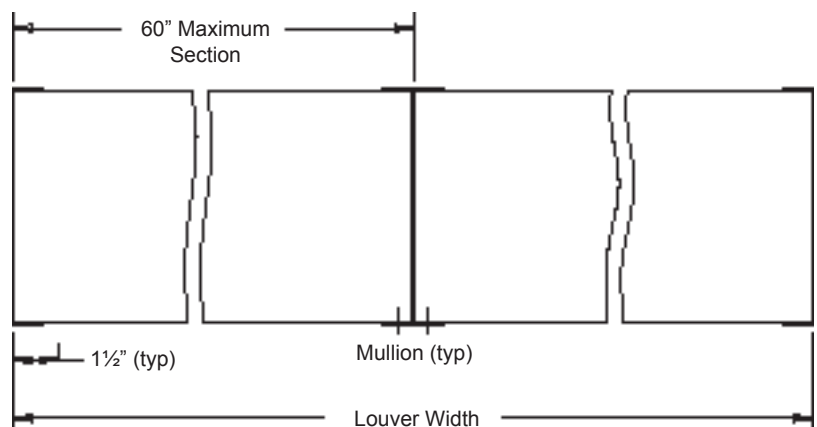
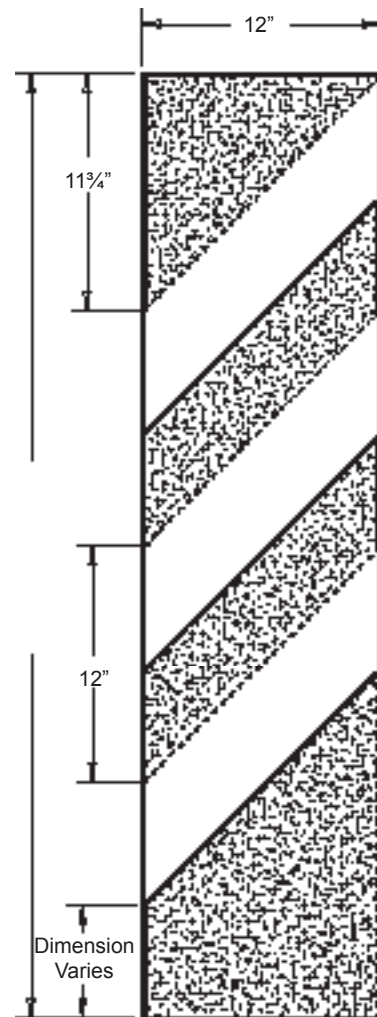
Finish - Baked Enamel, Kynar, or Anodize

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undercut.
2. Shipping louvers by commercial carrier requires at least one louver dimension not to exceed 84" in height or width.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
AAC1212	12"W x 22"H	60"W x 96"H



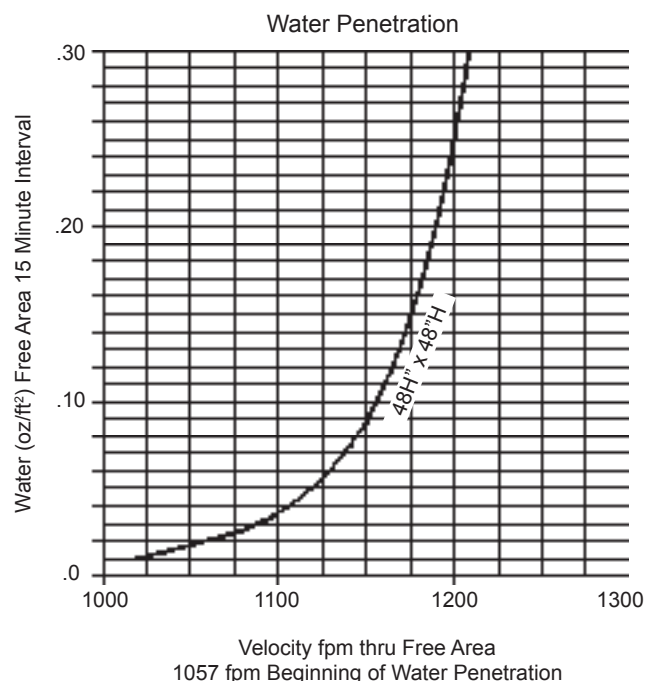
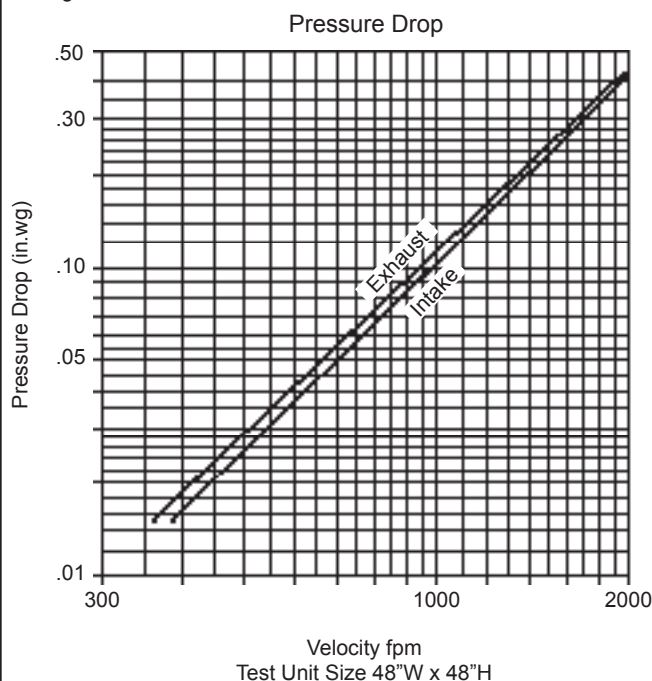
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MODEL AAC1212

12" Deep • 12" Blade Spacing • Aluminum Acoustical Louver

Ratings do not include the effect of birdscreen.



Sound Transmission Loss

Octive Band	1	2	3	4	5	6	7	8
Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Sound Transmission Loss (db)	8	8	7	9	13	15	12	10
Free Field Noise Reduction	14	14	13	15	19	21	18	16

Attenuation

Distance From Louver	Octive Band Center Frequency (Hz)							
	1	2	3	4	5	6	7	8
	63	125	250	500	1000	2000	4000	8000
0	14	14	13	15	19	21	18	16
10	26	26	25	27	31	33	30	28
50	40	40	39	41	45	47	44	42
100	46	46	45	47	45	53	50	48
200	52	52	51	53	53	59	56	54
500	60	60	59	61	65	67	64	62
1000	66	66	65	67	71	73	70	68

The Attenuation Chart is a combination of the model AAC1212 sound transmission loss and the reduction of sound energy as a function of distance.

Free Area sq.ft.

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	24"	0.27	0.45	0.63	0.81	0.98	1.16	1.34	1.52	1.70
	36"	0.54	0.90	1.25	1.61	1.97	2.33	2.69	3.04	3.40
	48"	0.81	1.34	1.88	2.42	2.95	3.49	4.03	4.56	5.10
	60"	1.07	1.79	2.51	3.22	3.94	4.65	5.37	6.09	6.80
	72"	1.34	2.24	3.13	4.03	4.92	5.82	6.71	7.61	8.50
	84"	1.61	2.69	3.76	4.83	5.91	6.98	8.06	9.13	10.20
	96"	1.88	3.13	4.39	5.64	6.89	8.14	9.40	10.65	11.90

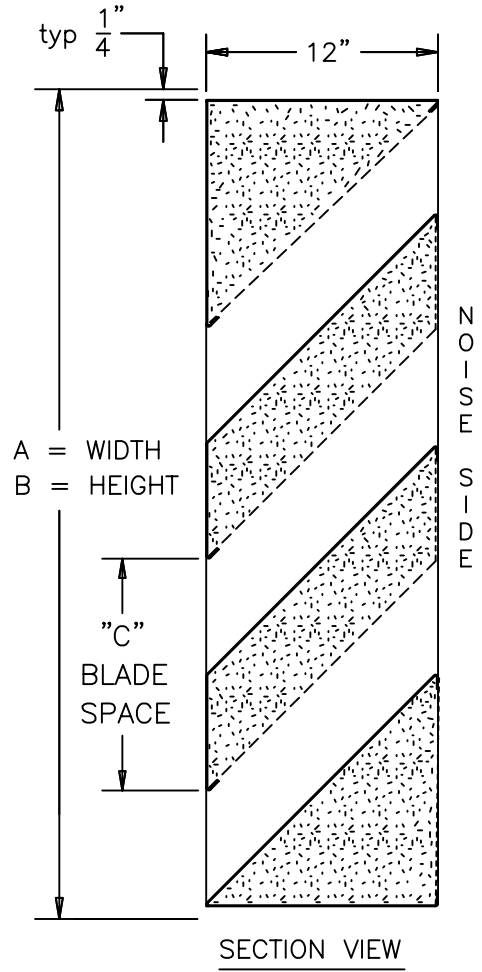
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In the interest of product development, Air Balance reserves the right to make changes without notice.

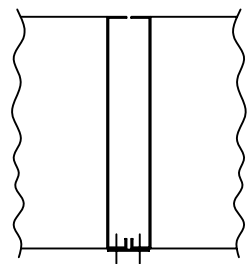
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FABRICATED ALUMINUM, 12" DEEP, HEAVY GAUGE, ACOUSTICAL FIXED TYPE BLADE



MODEL AAC-1215
STANDARD SPECIFICATIONS

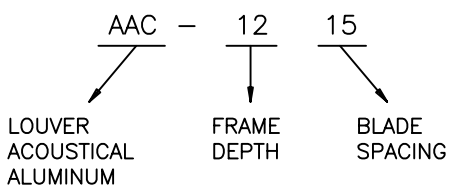
- FRAME: 12" DEEP, 12 GAUGE ALUMINUM.
- BLADES: 16 GAUGE ALUMINUM (NON NOISE SIDE).
20 GAUGE PERFORATED ALUMINUM (NOISE SIDE).
- INSULATION: WATER RESISTANT SOUND ABSORBING MATERIAL
- FINISH: MILL.
- SCREEN: 1/2" REMOVABLE EXPANDED ALUMINUM BIRD SCREEN, LOCATED ON INTERIOR (NOISE SIDE).
- MAXIMUM PANEL SIZE : 72" x 96".
MINIMUM PANEL SIZE : 12" x 36"
- DIMENSIONS: "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING SIZES. LOUVERS ARE MADE 1/2" UNDERSIZE.



STANDARD VERTICAL
MULLION

MODEL No.	"C" BLADE SPACE
AAC-1215	9"

LOUVER MODEL No. DESCRIPTION



STC CLASS 10

OCTAVE BAND	1	2	3	4	5	6	7	8
FREQUENCY (Hz)	63	125	250	500	1K	2K	4K	8K
TRANSMISSION LOSS (db)	2	6	6	9	12	11	9	11
FREE FIELD NOISE REDUCTION (db)	8	12	12	15	18	17	15	17

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AAC-1215 ACOUSTICAL LOUVER

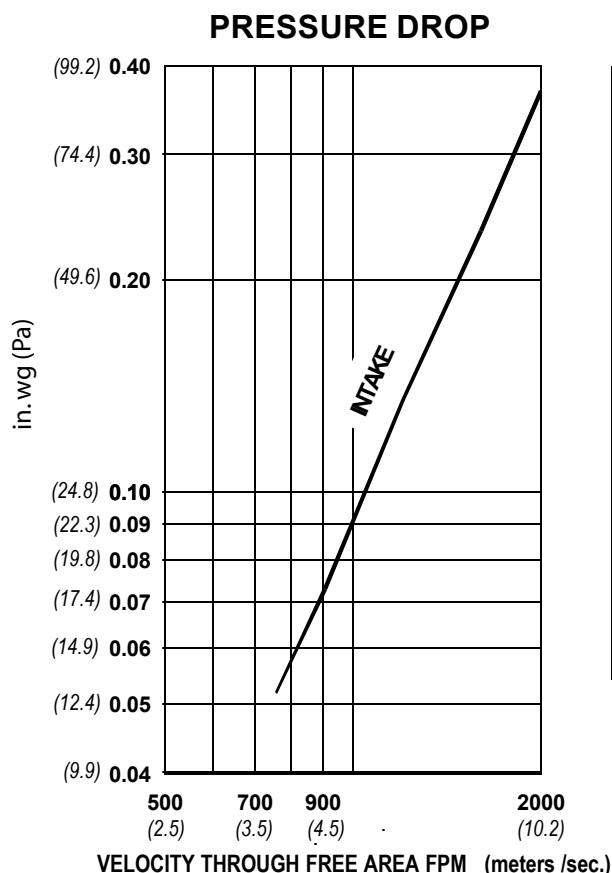
DRN. BY
ESS

DATE
12-19-00

DWG. NO.
AAC-1215

REV.

Pressure Drop : .13 in. wg. (32.25 Pa.) at 1173 fpm (5.95 m/s) and 4129 SCFM (1.73 scm/s)
Free Area : 5.53 sq.ft. (0.495 sq. m.) = 35% for 48" x 48" (1.22 m x 1.22 m) test size



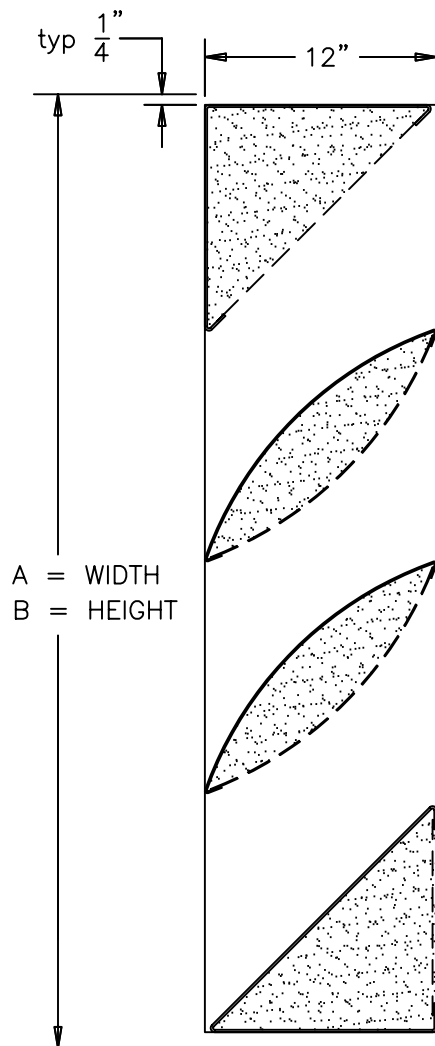
standard air - .075 lbs. per cu. ft.
Ratings do not include the effect of a bird screen

FREE AREA IN SQUARE FEET (sq. meters)									
		WIDTH							
	in.	12	24	30	36	42	48	54	60
	mm	304	609	762	914	1066	1219	1371	1524
HEIGHT	31	0.61	1.38	1.77	2.16	2.54	2.93	3.31	3.70
	787	0.06	0.13	0.16	0.20	0.24	0.27	0.31	0.34
	36	0.80	1.82	2.33	2.83	3.34	3.85	4.36	4.86
	914	0.07	0.17	0.22	0.26	0.31	0.36	0.40	0.45
	48	1.15	2.61	3.34	4.07	4.80	5.53	6.26	6.99
	1219	0.11	0.24	0.31	0.38	0.45	0.51	0.58	0.65
	60	1.37	3.10	3.96	4.83	5.69	6.56	7.42	8.29
	1524	0.13	0.29	0.37	0.45	0.53	0.61	0.69	0.77
	72	1.65	3.73	4.77	5.81	6.85	7.89	8.93	9.97
	1828	0.15	0.35	0.44	0.54	0.64	0.73	0.83	0.93
	84	2.06	4.66	5.96	7.26	8.56	9.86	11.16	12.46
	2133	0.19	0.43	0.55	0.67	0.80	0.92	1.04	1.16
96	2.06	4.66	5.96	7.26	8.56	9.86	11.16	12.46	
2438	0.19	0.43	0.55	0.67	0.80	0.92	1.04	1.16	

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height with a single panel. Unusually high wind loading may require structural supports on non-multiple wide and multiple high assemblies. **Structural supports and mounting accessories are not supplied as a standard.**

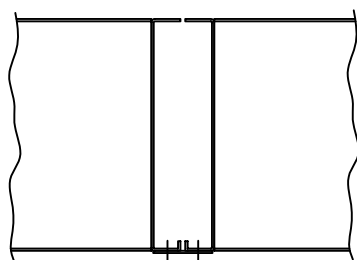
AAC-1215 Acoustical Louver

FABRICATED ALUMINUM, 12" DEEP, AIRFOIL BLADE, HEAVY GAUGE, ACOUSTICAL FIXED TYPE BLADE



A = WIDTH
B = HEIGHT

SECTION VIEW



STANDARD VERTICAL
MULLION

MODEL AAC-12AF STANDARD MATERIAL SPECIFICATIONS

FRAME: 12" DEEP, 12 GAUGE ALUMINUM.

BLADES: 16 GAUGE ALUMINUM (NON NOISE SIDE).
20 GAUGE PERFORATED ALUMINUM (NOISE SIDE).

INSULATION: WATER RESISTANT SOUND ABSORBING MATERIAL.

SCREEN: 1/2" REMOVABLE EXPANDED ALUMINUM BIRD
SCREEN LOCATED ON INTERIOR.

FINISH: MILL.

NOTES

- 1) DIMENSIONS "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING SIZES, LOUVERS ARE MADE 1/2" UNDERSIZE.
- 2) MULTI-WIDE BY MULTI-HIGH LOUVERS REQUIRE ADDITIONAL STRUCTURAL SUPPORT AT VERTICAL MULLION ON INTERIOR SIDE OF LOUVER, NOT SUPPLIED BY AWV.
- 3) MULTIPLE PANEL LOUVER UNITS WILL BE SHIPPED UNASSEMBLED FOR EASE OF INSTALLATION.
- 4) MAXIMUM PANEL SIZE: 72 x 96
MINIMUM PANEL SIZE: 12 x 30

Model AAC-12AF

Octave Bands	1	2	3	4	5	6	7	8
Frequency (Hz)	63	125	250	500	1K	2K	4K	8K
Free Field Noise Reduction (db)	14	12	14	19	21	19	16	15

THE LOUVER MODEL ACC-12AF HAS RECEIVED A
CERTIFIED STC RATING OF 13

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A MESTEK COMPANY

7435 INDUSTRIAL RD
Phone (859) 538-3400

FLORENCE, KY
Fax (859) 647-7810

AAC-12AF ACOUSTICAL LOUVER

DRN. BY
ESS

DWG. NO.

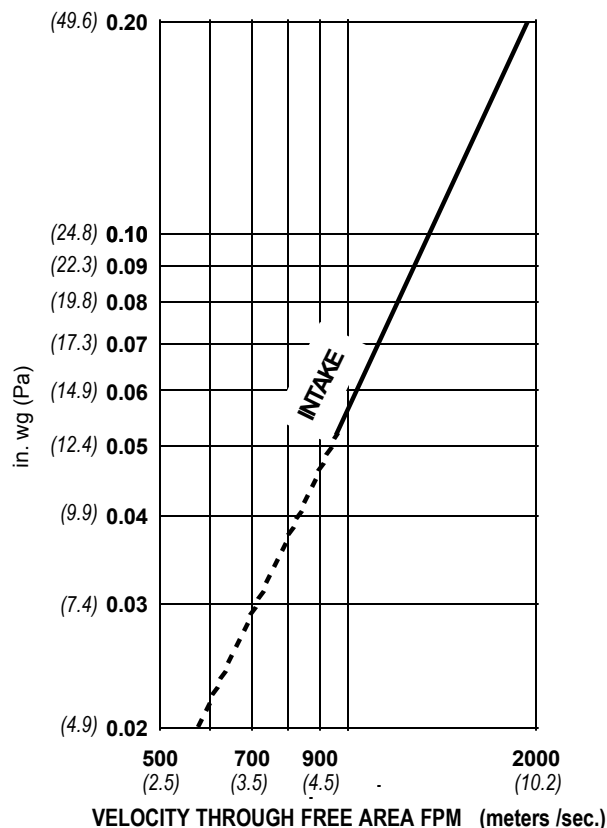
REV.

DATE
10-04-06

AAC-12AF

Water Penetration : .01 oz. (3.0 g.) at 1156 fpm (5.87 m/s) recommended free area velocity
Pressure Drop
Free Area : 3.83 sq.ft. (0.355 sq. m.) = 24% for 48" x 48" (1.22 m x 1.22 m) test size

PRESSURE DROP



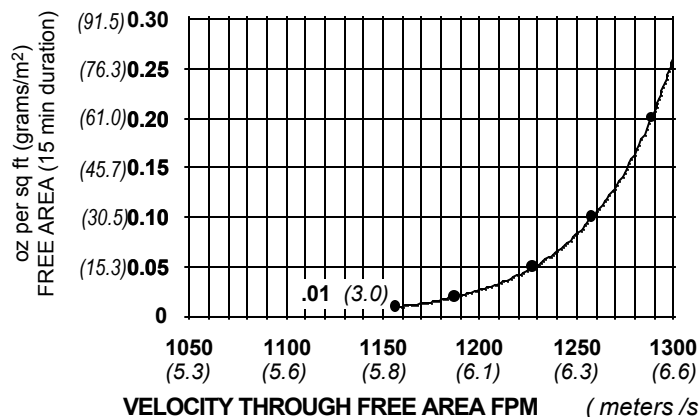
standard air - .075 lbs. per cu. ft.
 Ratings do not include the effect of a bird screen

This product was tested in accordance
 with AMCA Standard 500L

FREE AREA IN SQUARE FEET (sq. meters)

		WIDTH							
	in.	12	24	30	36	42	48	54	60
	mm	304	609	762	914	1066	1219	1371	1524
HEIGHT	24	0.36	0.82	1.05	1.28	1.51	1.74	1.97	2.20
	609	0.03	0.08	0.10	0.12	0.14	0.16	0.18	0.20
	36	0.58	1.31	1.67	2.04	2.40	2.76	3.13	3.49
	914	0.05	0.12	0.16	0.19	0.22	0.26	0.29	0.32
	48	0.80	1.81	2.32	2.82	3.33	3.83	4.34	4.84
	1219	0.07	0.17	0.22	0.26	0.31	0.36	0.40	0.45
	60	1.01	2.30	2.94	3.58	4.22	4.86	5.50	6.14
	1524	0.09	0.21	0.27	0.33	0.39	0.45	0.51	0.57
	72	1.24	2.80	3.58	4.36	5.14	5.92	6.71	7.49
	1828	0.11	0.26	0.33	0.41	0.48	0.55	0.62	0.70
84	1.45	3.28	4.20	5.12	6.03	6.95	7.87	8.78	
2133	0.13	0.31	0.39	0.48	0.56	0.65	0.73	0.82	
96	1.67	3.79	4.85	5.90	6.96	8.02	9.08	10.13	
2438	0.16	0.35	0.45	0.55	0.65	0.75	0.84	0.94	

WATER PENETRATION



Both maximum recommended free area velocity and beginning of water penetration are 1156 fpm at standard air - .075 lbs. per cu. ft.
 The above water penetration data is based on mill finish, 48" x 48" test size per AMCA Standard 511.

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height with a single panel. Unusually high wind loading may require structural supports on non-multiple wide and multiple high assemblies. **Structural supports and mounting accessories are not supplied as a standard.**

Below is an explanation of how to use the performance data for the recommended free area velocity of 1156 (5.87 m/s).

To determine minimum free area required for louver:

- Step #1:** Divide the required CFM flow by the maximum recommended free area velocity.
Step #2: Select the most desirable louver size, from the free area table, that meets the minimum free area requirement.
Step #3: Compare specified performance to the certified water penetration and pressure drop ratings.

Example: Given 5,000 CFM design flow
Step #1:
 min. free area = $\frac{\text{Design CFM}}{\text{Max. Recommended Velocity}}$
 = $\frac{5,000}{1156} = 4.32 \text{ sq. ft.}$

Step #2: From the free area table above the approximate louver size is 54" x 48" = (4.34 sq. ft.)

MODEL AAC47

4" Deep • Formed Steel • Acoustical Louver

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 16-GA galvanized steel**BLADE:** 18-GA galvanized steel on exterior with 22-GA galvanized perforated steel on interior surface; Approximate blade centers 7½"**INSULATION:** Sound insulation**ASSEMBLY:** Riveted and or welded, with head, sill and blades contained within jambs**FINISH:** Mill**SCREEN:** None**OPTIONS**

Flange Frame

Finish - Baked Enamel, Kynar, Anodize

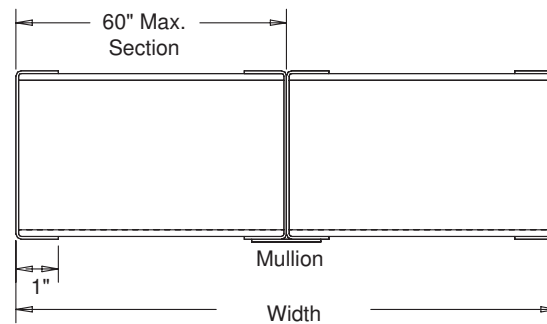
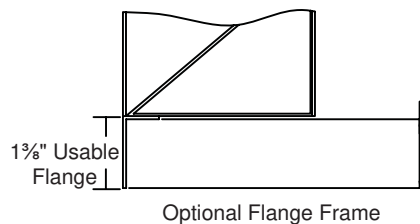
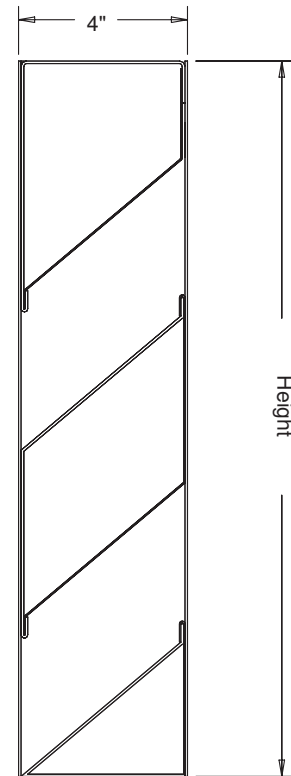
Screen - ½" sq. Mesh, 19-GA Galvanized

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided ½" undersize.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
AAC47	12"W x 18"H	60"W x 96"H

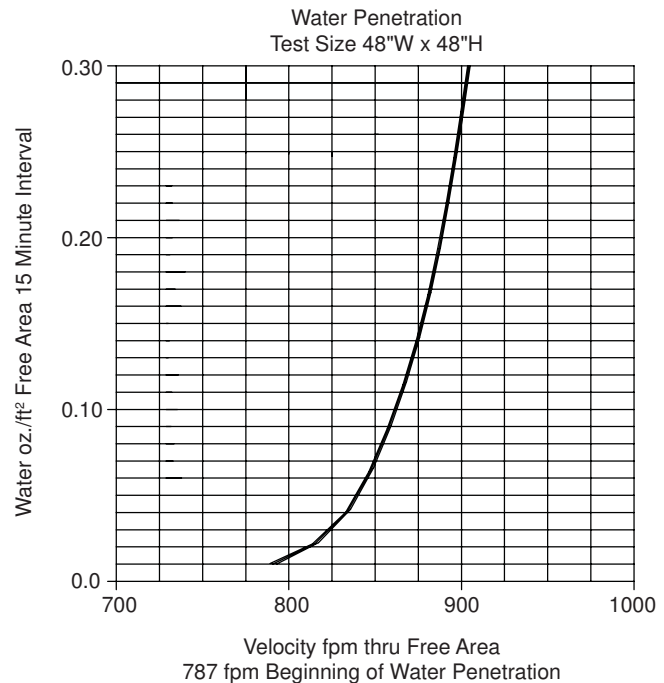
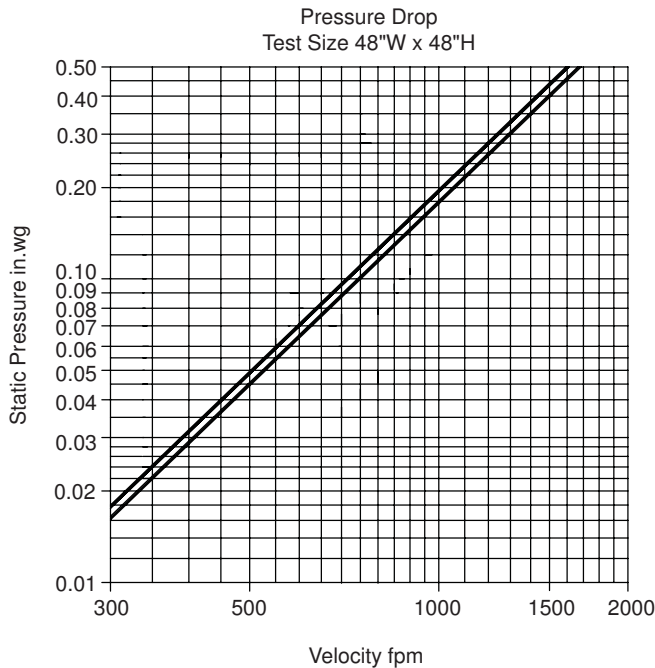


MODEL AAC47

4" Deep • Formed Steel • Acoustical Louver

Performance Data:

Tests of a 48"W x 48"H sample by an AMCA registered laboratory according to AMCA Standard 500 shows low water penetration. Tests show less than .02 oz/sq.ft. water penetration at 787 fpm with less than .11 in.wg pressure drop (intake) and 12 in.wg pressure drop (exhaust). Ratings do not include the effect of birdscreen.



AMCA Registered Laboratory is a laboratory equipped and staffed to conduct tests according to the appropriate AMCA Test method and which is licensed as a AMCA Registered Laboratory.

		Free Area sq.ft								
		Width								
Height		12	18	24	30	36	42	48	54	60
	24	.47	.75	1.03	1.32	1.60	1.88	2.16	2.24	2.72
	36	.68	1.09	1.50	1.91	2.32	2.73	3.13	3.54	3.95
	48	1.02	1.63	2.24	2.85	3.46	4.07	4.51	5.29	5.91
	60	1.19	1.91	2.62	3.234	4.05	4.77	5.48	6.20	6.91
	72	1.53	2.45	3.37	4.29	5.21	6.13	7.05	7.97	8.89
	84	1.72	2.76	3.79	4.83	5.86	6.90	7.93	8.96	10.00
	96	2.04	3.27	4.50	5.72	6.95	8.16	9.40	10.63	11.85

The ABI Model AAC47 acoustical louver low frequency and high frequency sound performance data is presented in two separate tables. Review the appropriate table and select the attenuation value for the design noise criteria corrective action required.

Low Frequency

Octave Band/Frequency	1/63	2/125	3/250	4/500	5/1000	6/2000	7/4000	8/8000
Free Field Noise Reduction db	12	14	12	12	9	11	13	15

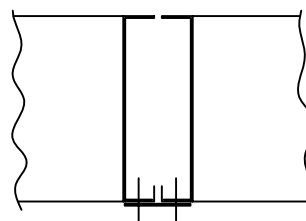
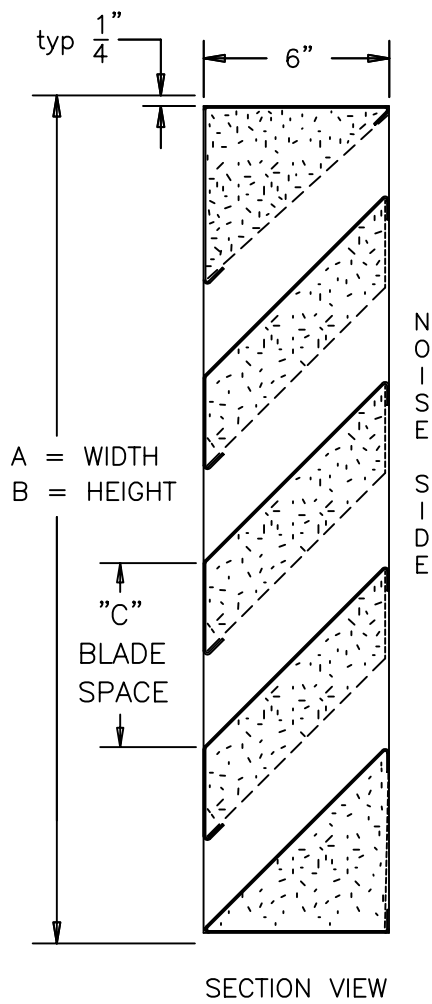
High Frequency

Octave Band/Frequency	1/63	2/125	3/250	4/500	5/1000	6/2000	7/4000	8/8000
Free Field Noise Reduction db	8	7	9	10	14	16	16	18

FABRICATED GALVANIZED, 6" DEEP, HEAVY GAUGE, ACOUSTICAL FIXED TYPE BLADE

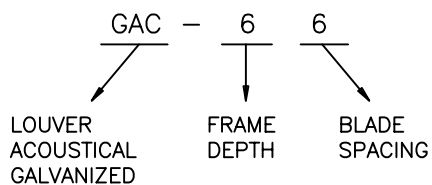
MODEL GAC-66 STANDARD SPECIFICATIONS

- FRAME: 6" DEEP, 16 GAUGE GALVANIZED.
- BLADES: 20 GAUGE GALVANIZED (NON NOISE SIDE).
22 GAUGE PERFORATED GALVANNEALED (NOISE SIDE)
- INSULATION: WATER RESISTANT SOUND ABSORBING MATERIAL
- FINISH: MILL.
- SCREEN: 1/2" REMOVABLE EXPANDED ALUMINUM BIRD SCREEN, LOCATED ON INTERIOR (NOISE SIDE).
- MAXIMUM PANEL SIZE: 72" X 96".
- MINIMUM PANEL SIZE: 12" X 15".
- DIMENSIONS: "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING SIZES. LOUVERS ARE MADE 1/2" UNDERSIZE.



MODEL No.	"C" BLADE SPACE
GAC-66	6"

LOUVER MODEL No. DESCRIPTION



STC C

OCTAVE BAND	1	2	3	4	5	6	7	8
FREQUENCY (Hz)	63	125	250	500	1K	2K	4K	8K
TRANSMISSION LOSS (db)	1	6	6	9	13	15	14	14
FREE FIELD NOISE REDUCTION (db)	7	12	12	15	19	21	20	20

abi. air balance

A MESTEK COMPANY

7435 INDUSTRIAL RD
Phone (419) 865-5000

FLORENCE, KY
Fax (419) 865-1375

GAC-66 ACOUSTICAL LOUVER

DRN. BY
ESS

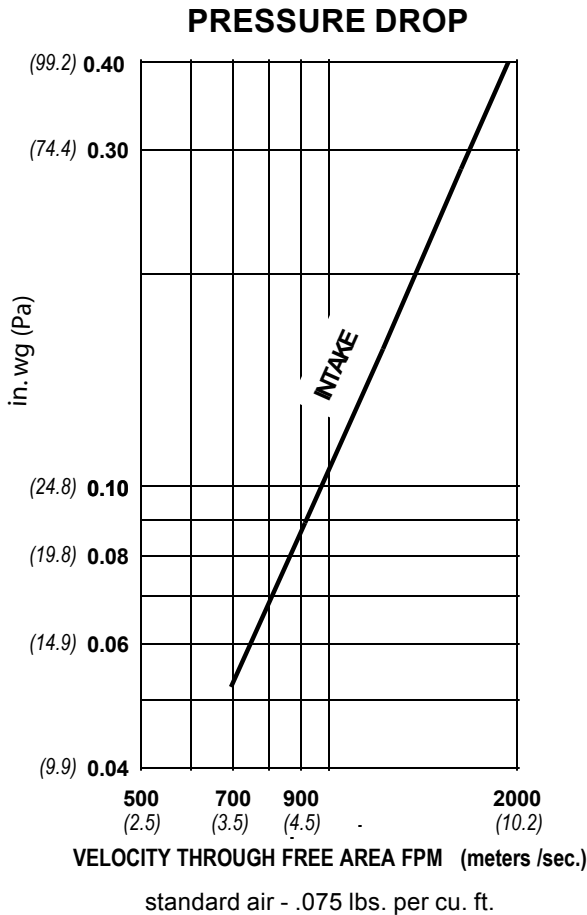
DATE
01-10-03

DWG. NO.

GAC-66

REV.

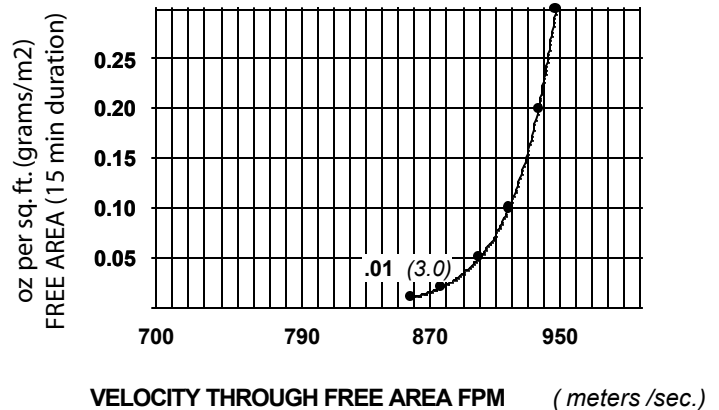
Water Penetration : .01 oz. (3.0 g) at 858 fpm (4.36 m/s) recommended free area velocity
Pressure Drop : .076 in. wg. (18.8 Pa.) at 858 fpm (4.36 m/s) and 3460 SCFM (1.63 scm/s)
Free Area



This product was tested in accordance with AMCA Standard 500L.

FREE AREA IN SQUARE FEET (sq. meters)

HEIGHT	WIDTH										
	in.	12	24	30	36	42	48	54	60	66	72
	mm	304	609	762	914	1066	1219	1371	1524	1676	1828
20	0.26	0.58	0.74	0.89	1.05	1.21	1.37	1.52	1.68	1.84	
508	0.02	0.05	0.07	0.08	0.10	0.11	0.13	0.14	0.16	0.17	
24	0.39	0.87	1.10	1.34	1.58	1.81	2.05	2.29	2.52	2.76	
609	0.04	0.08	0.10	0.12	0.15	0.17	0.19	0.21	0.23	0.26	
36	0.66	1.45	1.84	2.23	2.63	3.02	3.42	3.81	4.21	4.60	
914	0.06	0.13	0.17	0.21	0.24	0.28	0.32	0.35	0.39	0.43	
48	0.92	2.02	2.58	3.13	3.68	4.23	4.78	5.34	5.89	6.44	
1219	0.09	0.19	0.24	0.29	0.34	0.39	0.44	0.50	0.55	0.60	
60	1.18	2.60	3.31	4.02	4.73	5.44	6.15	6.86	7.57	8.28	
1524	0.11	0.24	0.31	0.37	0.44	0.51	0.57	0.64	0.70	0.77	
72	1.45	3.18	4.05	4.92	5.78	6.65	7.52	8.39	9.25	10.12	
1828	0.13	0.30	0.38	0.46	0.54	0.62	0.70	0.78	0.86	0.94	
84	1.71	3.76	4.78	5.81	6.84	7.86	8.89	9.91	10.94	11.96	
2133	0.16	0.35	0.44	0.54	0.64	0.73	0.83	0.92	1.02	1.11	
96	1.97	4.34	5.52	6.70	7.89	9.07	10.25	11.44	12.62	13.80	
2438	0.18	0.40	0.51	0.62	0.73	0.84	0.95	1.06	1.17	1.28	



Both maximum recommended free area velocity and beginning of water penetration are **858 fpm** at standard air - .075 lbs. per cu. ft. The above water penetration data is based on mill finish, 48" x 48" test size per AMCA Standard 511.

Below is an explanation of how to use the AMCA performance data for the recommended free area velocity of 858 (4.36 m/s).

To determine minimum free area required for louver:

Step #1: Divide the required CFM flow by the maximum recommended free area velocity.

Step #2: Select the most desirable louver size, from the free area table, that meets the minimum free area requirement.

Step #3: Compare specified performance to the certified water penetration and pressure drop ratings.

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height with a single panel. Unusually high wind loading may require assemblies. **Structural supports and mounting accessories are not supplied as a standard.**

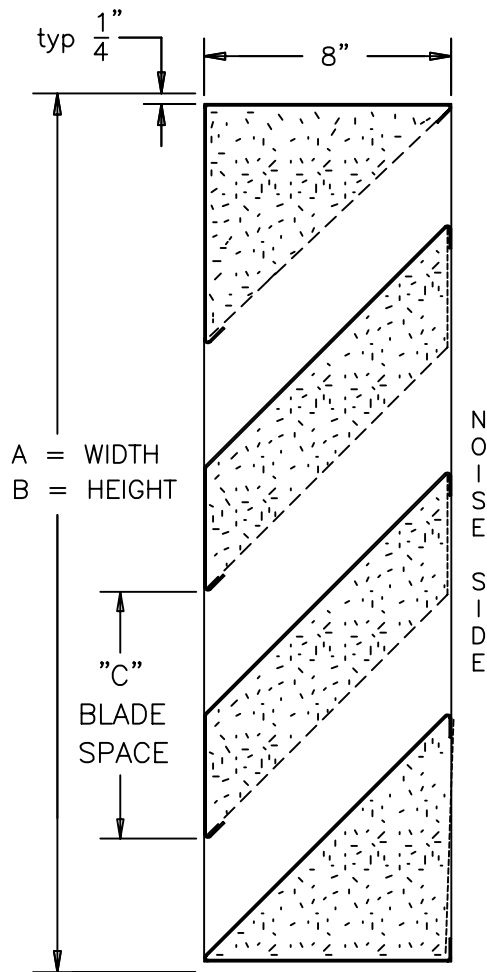
Example: Given 5,000 CFM design flow

Step #1:

$$\text{min. free area} = \frac{\text{Design CFM}}{\text{Max. Recommended Velocity}} = \frac{5,000}{858} = 5.83 \text{ sq. ft.}$$

Step #2: From the free area table above the approximate louver size is **54" x 60"** = (6.15 sq. ft.)

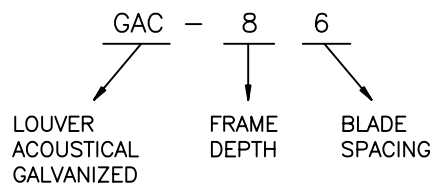
FABRICATED GALVANIZED, 8" DEEP, HEAVY GAUGE, ACOUSTICAL FIXED TYPE BLADE



SECTION VIEW

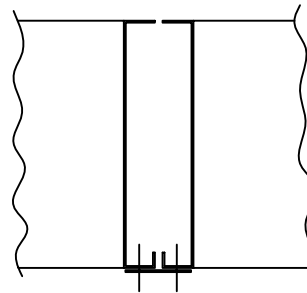
MODEL No.	"C" BLADE SPACE
GAC-86	6"

LOUVER MODEL No. DESCRIPTION



MODEL GAC-86 STANDARD SPECIFICATIONS

- FRAME: 8" DEEP, 16 GAUGE GALVANIZED STEEL.
- BLADES: 20 GAUGE GALVANIZED STEEL (NON NOISE SIDE).
22 GAUGE PERFORATED GALVANNEALED STEEL (NOISE SIDE).
- INSULATION: WATER RESISTANT SOUND ABSORBING MATERIAL
- FINISH: MILL.
- SCREEN: $\frac{1}{2}$ " REMOVABLE EXPANDED ALUMINUM BIRD SCREEN, LOCATED ON INTERIOR (NOISE SIDE).
- MAXIMUM PANEL SIZE: 72" X 96".
- MINIMUM PANEL SIZE: 12" X 17".
- DIMENSIONS: "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING SIZES. LOUVERS ARE MADE $\frac{1}{2}$ " UNDERSIZE.

STANDARD VERTICAL
MULLION

STC CLASS 14

OCTAVE BAND	1	2	3	4	5	6	7	8
FREQUENCY (Hz)	63	125	250	500	1K	2K	4K	8K
TRANSMISSION LOSS (db)	1	4	5	9	16	19	16	13
FREE FIELD NOISE REDUCTION (db)	7	10	11	15	22	25	22	19

abi air balance

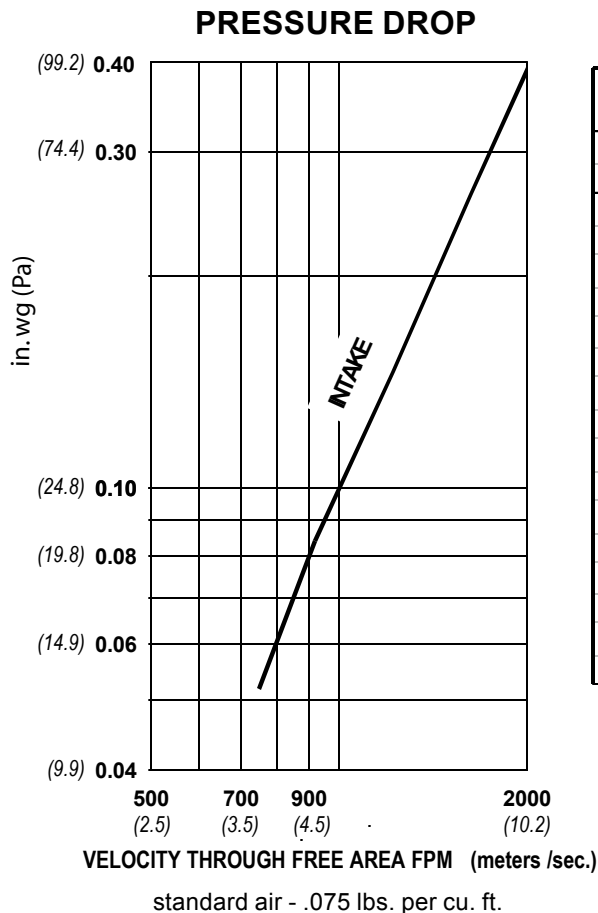
A MESTEK COMPANY

7435 INDUSTRIAL RD
Phone (419) 865-5000FLORENCE, KY
Fax (419) 865-1375

GAC-86 ACOUSTICAL LOUVER

DRN. BY	ESS	DWG. NO.	REV.
DATE	12-19-00	GAC-86	

Pressure Drop : .099 in. wg. (24.5 Pa.) at 990 fpm (5.03 m/s) and 3990 SCFM (1.88 scm/s)
Free Area

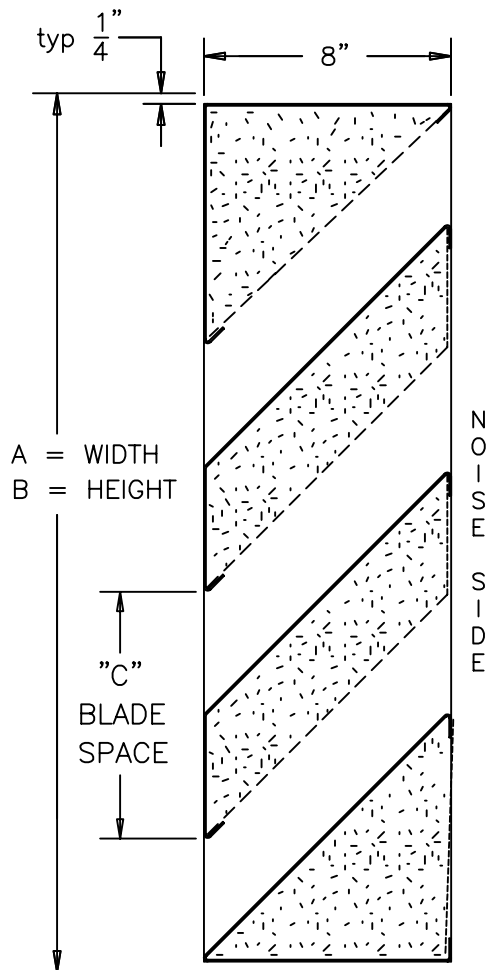


FREE AREA IN SQUARE FEET (sq. meters)									
		WIDTH							
	in.	12	24	30	36	42	48	54	60
	mm	304	609	762	914	1066	1219	1371	1524
HEIGHT	20	0.23	0.51	0.65	0.79	0.94	1.08	1.22	1.36
	508	0.02	0.05	0.06	0.07	0.09	0.10	0.11	0.13
	24	0.36	0.81	1.03	1.26	1.49	1.71	1.94	2.16
	609	0.03	0.08	0.10	0.12	0.14	0.16	0.18	0.20
	36	0.69	1.55	1.99	2.42	2.86	3.29	3.72	4.16
	914	0.06	0.14	0.18	0.23	0.27	0.31	0.35	0.39
	48	0.88	2.00	2.56	3.12	3.68	4.24	4.80	5.36
	1219	0.08	0.19	0.24	0.29	0.34	0.39	0.45	0.50
	60	1.15	2.60	3.33	4.05	4.78	5.50	6.23	6.95
	1524	0.11	0.24	0.31	0.38	0.44	0.51	0.58	0.65
	72	1.41	3.20	4.09	4.98	5.87	6.77	7.66	8.55
	1828	0.13	0.30	0.38	0.46	0.55	0.63	0.71	0.79
84	1.68	3.79	4.85	5.91	6.97	8.03	9.09	10.15	
2133	0.16	0.35	0.45	0.55	0.65	0.75	0.84	0.94	
96	1.94	4.39	5.62	6.84	8.07	9.29	10.52	11.75	
2438	0.18	0.41	0.52	0.64	0.75	0.86	0.98	1.09	

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height with a single panel. Unusually high wind loading may require assemblies. **Structural supports and mounting accessories are not supplied as a standard.**

GAC-86 Acoustical Louver

FABRICATED GALVANIZED, 8" DEEP, HEAVY GAUGE, ACOUSTICAL FIXED TYPE BLADE



SECTION VIEW

FRAME:
BLADES:

INSULATION:
FINISH:

SCREEN:

MODEL GAC-88 STANDARD SPECIFICATIONS

8" DEEP, 16 GAUGE GALVANIZED STEEL.

20 GAUGE GALVANIZED STEEL (NON NOISE SIDE).
22 GAUGE PERFORATED GALVANNEALED STEEL (NOISE SIDE).

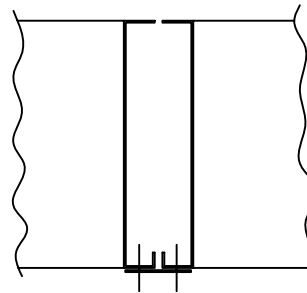
WATER RESISTANT SOUND ABSORBING MATERIAL
MILL.

$\frac{1}{2}$ " REMOVABLE EXPANDED ALUMINUM BIRD
SCREEN, LOCATED ON INTERIOR (NOISE SIDE).

MAXIMUM PANEL SIZE: 72" X 96".

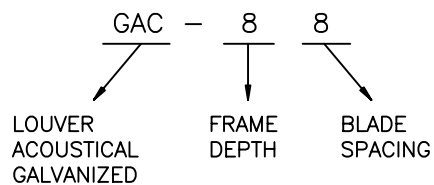
MINIMUM PANEL SIZE: 12" X 20".

DIMENSIONS: "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING
SIZES. LOUVERS ARE MADE $\frac{1}{2}$ " UNDERSIZE.

STANDARD VERTICAL
MULLION

MODEL No.	"C" BLADE SPACE
GAC-88	8"

LOUVER MODEL No. DESCRIPTION



STC CLASS 12

OCTAVE BAND	1	2	3	4	5	6	7	8
FREQUENCY (Hz)	63	125	250	500	1K	2K	4K	8K
TRANSMISSION LOSS (db)	1	5	6	9	13	16	13	11
FREE FIELD NOISE REDUCTION (db)	7	11	12	15	19	22	19	17

abi air balance

A MESTEK COMPANY

7435 INDUSTRIAL RD
Phone (859) 538-3400

FLORENCE, KY
Fax (859) 647-7810

GAC-88 ACOUSTICAL LOUVER

DRN. BY ESS

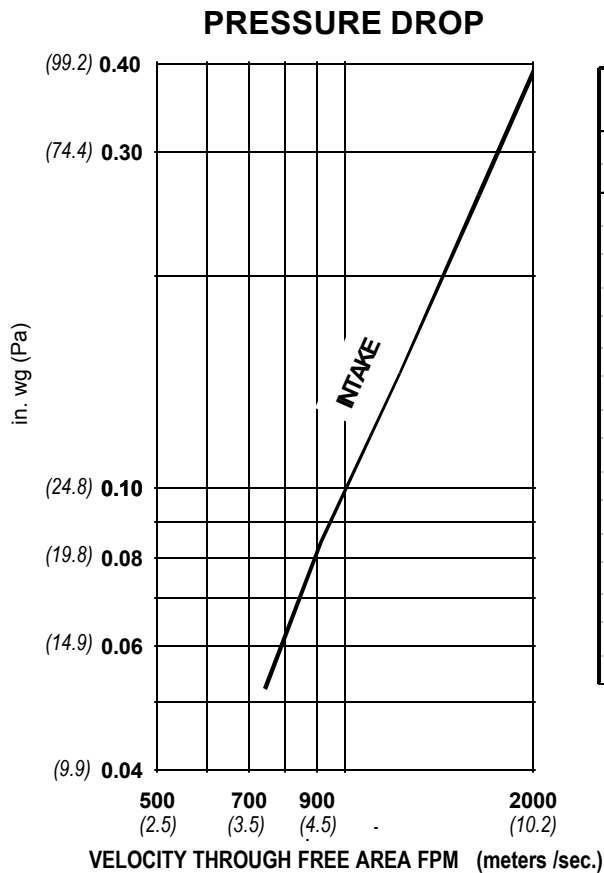
DATE 10-05-06

DWG. NO.

GAC-88

REV.

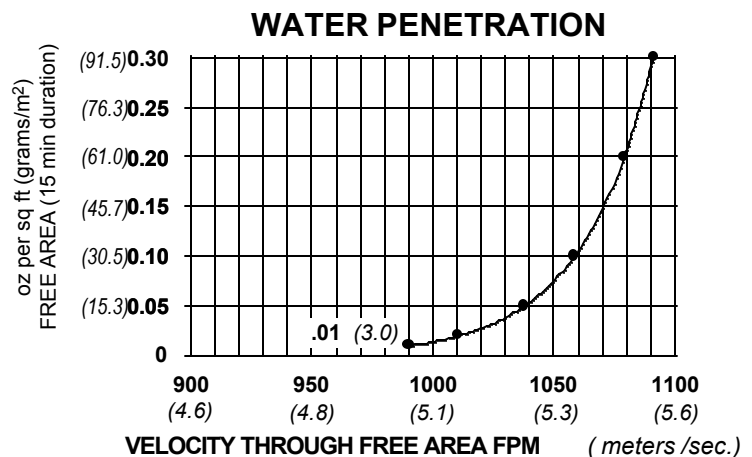
Water Penetration : .01 oz. (3.0 g.) at 990 fpm (5.03 m/s) recommended free area velocity
Pressure Drop
Free Area : 4.03 sq.ft. (0.374 sq. m.) = 25% for 48" x 48" (1.22 m x 1.22 m) test size



This product was tested in accordance with AMCA Standard 500L.

FREE AREA IN SQUARE FEET (sq. meters)

HEIGHT	WIDTH								
	in.	12	24	30	36	42	48	54	60
	mm	304	609	762	914	1066	1219	1371	1524
	20	0.31	0.69	0.88	1.08	1.27	1.46	1.66	1.85
	508	0.03	0.06	0.08	0.10	0.12	0.14	0.15	0.17
	24	0.31	0.69	0.88	1.08	1.27	1.46	1.66	1.85
	609	0.03	0.06	0.08	0.10	0.12	0.14	0.15	0.17
	36	0.66	1.50	1.92	2.34	2.76	3.18	3.60	4.02
	914	0.06	0.14	0.18	0.22	0.26	0.30	0.33	0.37
	48	0.84	1.90	2.43	2.97	3.50	4.03	4.56	5.09
	1219	0.08	0.18	0.23	0.28	0.32	0.37	0.42	0.47
	60	1.20	2.72	3.48	4.24	4.99	5.75	6.51	7.27
	1524	0.11	0.25	0.32	0.39	0.46	0.53	0.61	0.68
	72	1.38	3.12	4.00	4.87	5.74	6.61	7.48	8.36
	1828	0.13	0.29	0.37	0.45	0.53	0.61	0.70	0.78
	84	1.74	3.93	5.03	6.13	7.23	8.33	9.43	10.52
	2133	0.16	0.37	0.47	0.57	0.67	0.77	0.88	0.98
	96	1.92	4.34	5.55	6.76	7.97	9.18	10.39	11.61
	2438	0.18	0.40	0.52	0.63	0.74	0.85	0.97	1.08



Both maximum recommended free area velocity and beginning of water penetration are **990 fpm** at standard air - .075 lbs. per cu. ft.
The above water penetration data is based on mill finish, 48" x 48" test size per AMCA Standard 511.

Below is an explanation of how to use the performance data for the recommended free area velocity of 990 (5.03 m/s).

To determine minimum free area required for louver:

Step #1: Divide the required CFM flow by the maximum recommended free area velocity.

Step #2: Select the most desirable louver size, from the free area table, that meets the minimum free area requirement.

Step #3: Compare specified performance to the certified water penetration and pressure drop ratings.

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height with a single panel. Unusually high wind loading may require structural supports on non-multiple wide and multiple high assemblies. **Structural supports and mounting accessories are not supplied as a standard.**

Example: Given 5,000 CFM design flow

Step #1:

$$\text{min. free area} = \frac{\text{Design CFM}}{\text{Max. Recommended Velocity}} = \frac{5,000}{990} = 5.05 \text{ sq. ft.}$$

Step #2: From the free area table above the approximate louver size is **60" x 48"** = (5.09 sq. ft.)

MODEL GAC126

12" Deep • 6" Blade Spacing • Galvanized Steel Acoustical Louver

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 16-GA galvanized steel
BLADE: 18-GA galvanized steel airfoil exterior surface with 22-GA perforated steel interior surface
BLADE FILL: Sound insulation
SCREEN: ½" galvanized steel mesh (.041")
FINISH: Mill

OPTIONS

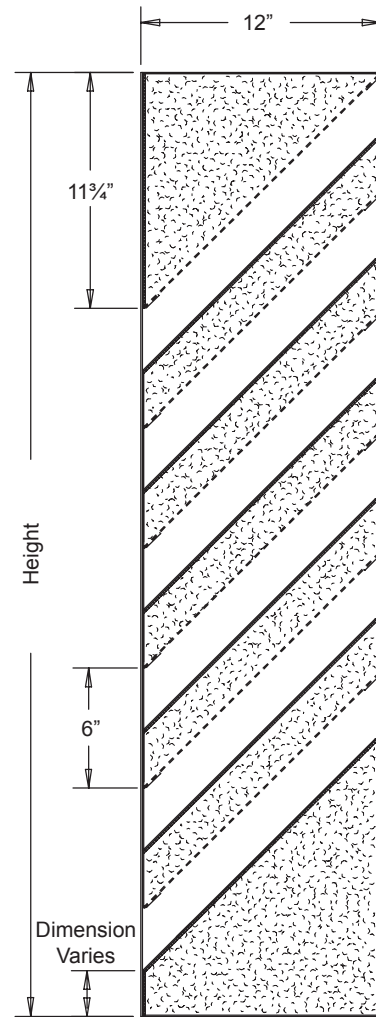
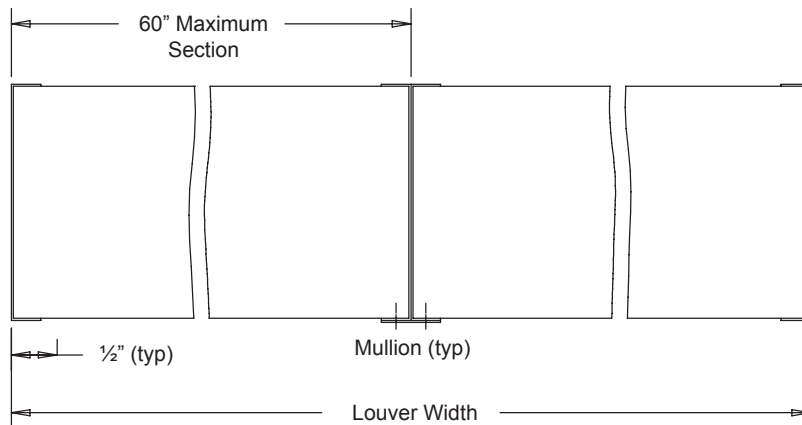
Finish - Baked Enamel, Kynar, or Anodize

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undercut.
2. Shipping louvers by commercial carrier requires at least one louver dimension not to exceed 84" in height or width.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
GAC126	12"W x 22"H	60"W x 96"H

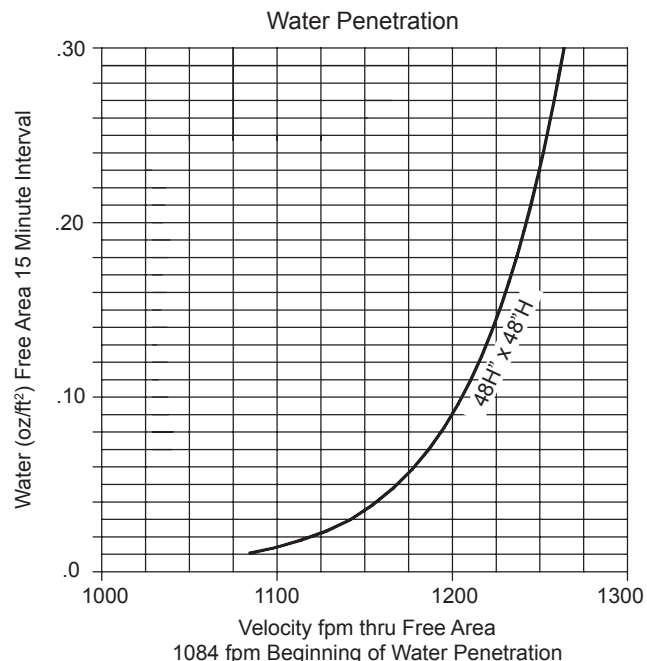
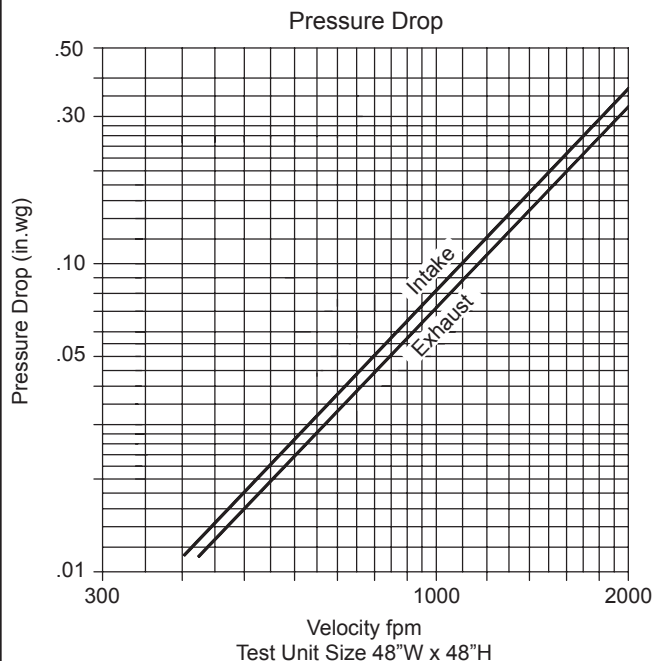


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MODEL GAC126

12" Deep • 6" Blade Spacing • Galvanized Steel Acoustical Louver



Sound Transmission Loss

Octave Band	1	2	3	4	5	6	7	8
Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Sound Transmission Loss (db)	8	6	6	12	18	23	19	13
Free Field Noise Reduction	14	12	12	18	24	29	25	19

Attenuation

Distance From Louver	Octave Band Center Frequency (Hz)							
	1	2	3	4	5	6	7	8
	63	125	250	500	1000	2000	4000	8000
0	14	12	12	18	24	29	25	19
10	26	24	24	30	36	41	37	31
50	40	44	30	44	50	55	51	45
100	46	50	44	50	56	61	57	51
200	52	52	50	56	62	67	67	57
500	60	58	56	64	70	75	71	65
1000	66	64	64	70	76	81	77	71

The Attenuation Chart is a combination of the model GAC126 sound transmission loss and the reduction of sound energy as a function of distance.

Free Area

		Width									
		12	18	24	30	36	42	48	54	60	
Height	24	.27	.44	.62	.80	.97	1.15	1.33	1.51	1.68	
	36	.53	.89	1.24	1.59	1.95	2.30	2.66	3.01	3.36	
	48	.80	1.33	1.86	2.39	2.93	3.45	3.98	4.52	5.05	
	60	1.06	1.77	2.48	3.19	3.90	4.60	5.31	6.02	6.73	
	72	1.33	2.21	3.10	3.98	4.87	5.76	6.64	7.53	8.41	
	84	1.59	2.66	3.72	4.78	5.84	6.91	7.97	9.03	10.09	
	96	1.86	3.10	4.34	5.58	6.82	8.06	9.30	10.45	11.78	

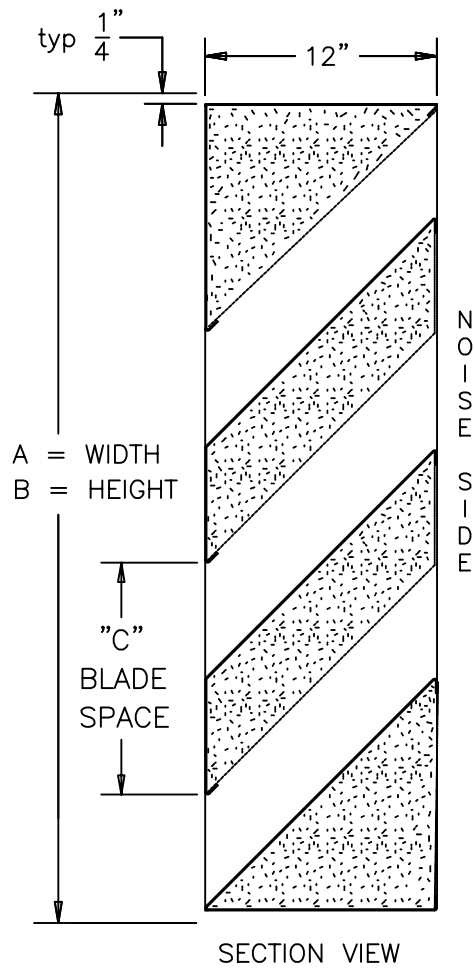
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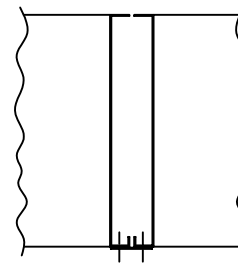
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FABRICATED GALVANIZED, 12" DEEP, HEAVY GAUGE, ACOUSTICAL FIXED TYPE BLADE



MODEL GAC-129 STANDARD SPECIFICATIONS

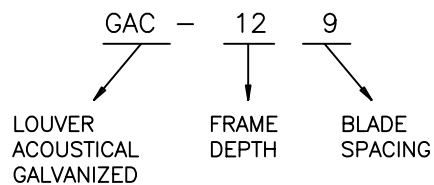
- FRAME: 12" DEEP, 16 GAUGE GALVANIZED STEEL.
- BLADES: 20 GAUGE GALVANIZED STEEL (NON NOISE SIDE).
22 GAUGE PERFORATED GALVANNEALED STEEL (NOISE SIDE).
- INSULATION: WATER RESISTANT SOUND ABSORBING MATERIAL
- FINISH: MILL.
- SCREEN: $\frac{1}{2}$ " REMOVABLE EXPANDED ALUMINUM BIRD SCREEN, LOCATED ON INTERIOR (NOISE SIDE).
- MAXIMUM PANEL SIZE : 72" x 96".
- MINIMUM PANEL SIZE : 12" x 24".
- DIMENSIONS: "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING SIZES. LOUVERS ARE MADE $\frac{1}{2}$ " UNDERSIZE.



STANDARD VERTICAL
MULLION

MODEL No.	"C" BLADE SPACE
GAC-129	9"

LOUVER MODEL No. DESCRIPTION



STC CLASS 21

OCTAVE BAND	1	2	3	4	5	6	7	8
FREQUENCY (Hz)	63	125	250	500	1K	2K	4K	8K
TRANSMISSION LOSS (db)	2	8	12	16	23	28	25	17
FREE FIELD NOISE REDUCTION (db)	8	14	18	22	29	34	31	23

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Phone (419) 865-5000

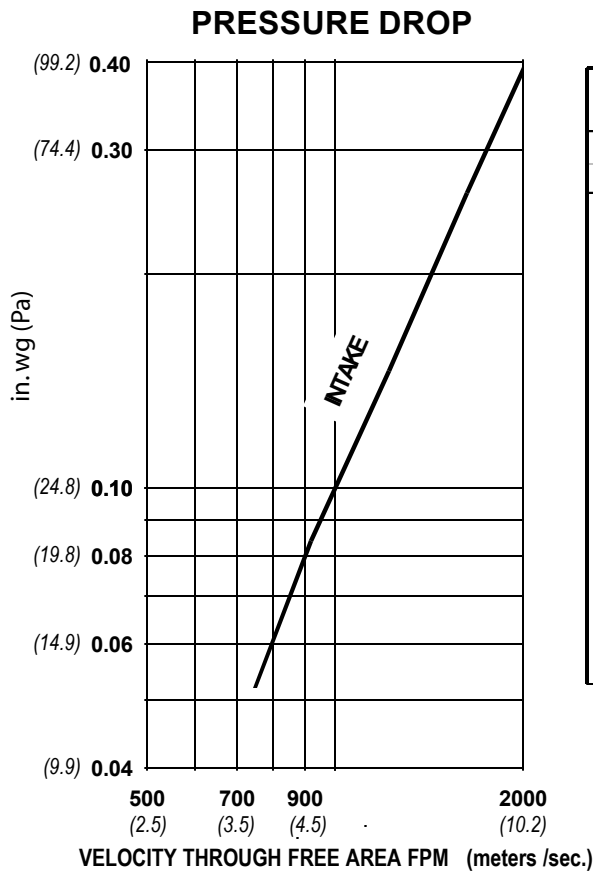
FLORENCE, KY
Fax (419) 865-1375

GAC-129 ACOUSTICAL LOUVER

DRN. BY	ESS	DWG. NO.	REV.
DATE	12-19-00	GAC-129	

Pressure Drop

Free Area : 2.38 sq.ft. (0.221 sq. m.) = 15% for 48" x 48" (1.22 m x 1.22 m) test size



FREE AREA IN SQUARE FEET (sq. meters)

		WIDTH							
	in.	12	24	30	36	42	48	54	60
	mm	304	609	762	914	1066	1219	1371	1524
HEIGHT	20	0.23	0.51	0.65	0.79	0.94	1.08	1.22	1.36
	508	0.02	0.05	0.06	0.07	0.09	0.10	0.11	0.13
	24	0.23	0.52	0.66	0.81	0.95	1.10	1.24	1.38
	609	0.02	0.05	0.06	0.07	0.09	0.10	0.12	0.13
	36	0.36	0.82	1.05	1.28	1.51	1.74	1.97	2.20
	914	0.03	0.08	0.10	0.12	0.14	0.16	0.18	0.20
	48	0.50	1.12	1.44	1.75	2.07	2.38	2.69	3.01
	1219	0.05	0.10	0.13	0.16	0.19	0.22	0.25	0.28
	60	0.76	1.73	2.21	2.70	3.18	3.66	4.15	4.63
	1524	0.07	0.16	0.21	0.25	0.30	0.34	0.39	0.43
	72	0.90	2.03	2.60	3.17	3.74	4.30	4.87	5.44
	1828	0.08	0.19	0.24	0.29	0.35	0.40	0.45	0.51
	84	1.03	2.34	2.99	3.64	4.29	4.95	5.60	6.25
	2133	0.10	0.22	0.28	0.34	0.40	0.46	0.52	0.58
	96	1.30	2.94	3.77	4.59	5.41	6.23	7.05	7.87
	2438	0.12	0.27	0.35	0.43	0.50	0.58	0.66	0.73

standard air - .075 lbs. per cu. ft.
Ratings do not include the effect of a bird screen

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height with a single panel. Unusually high wind loading may require structural supports on non-multiple wide and multiple high assemblies. **Structural supports and mounting accessories are not supplied as a standard.**

GAC-129 Acoustical Louver

MODEL GAC1212

12" Deep • 12" Blade Spacing • Galvanized Steel Acoustical Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 16-GA galvanized steel
BLADE: 18-GA galvanized steel airfoil exterior surface with 22-GA perforated steel interior surface
BLADE FILL: Sound insulation
SCREEN: ½" galvanized steel mesh (.041")
FINISH: Mill

OPTIONS

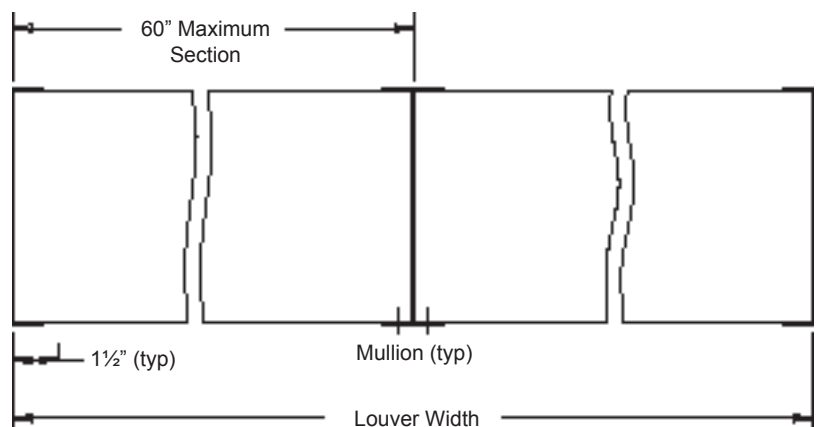
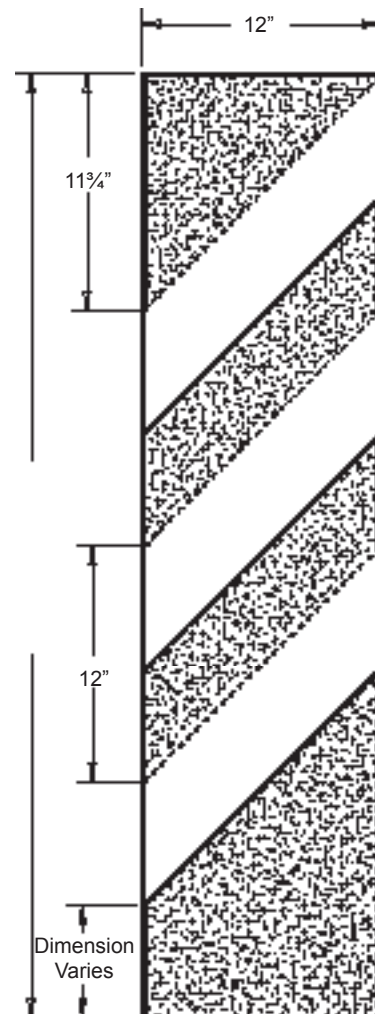
Finish - Baked Enamel, Kynar, or Anodize

NOTES

1. "A" width and "B" height are opening dimensions. Louvers are provided approximately ½" undercut.
2. Shipping louvers by commercial carrier requires at least one louver dimension not to exceed 84" in height or width.

LOUVER SIZES

Panels	Min Panel	Max Single Panel
GAC1212	12"W x 22"H	60"W x 96"H



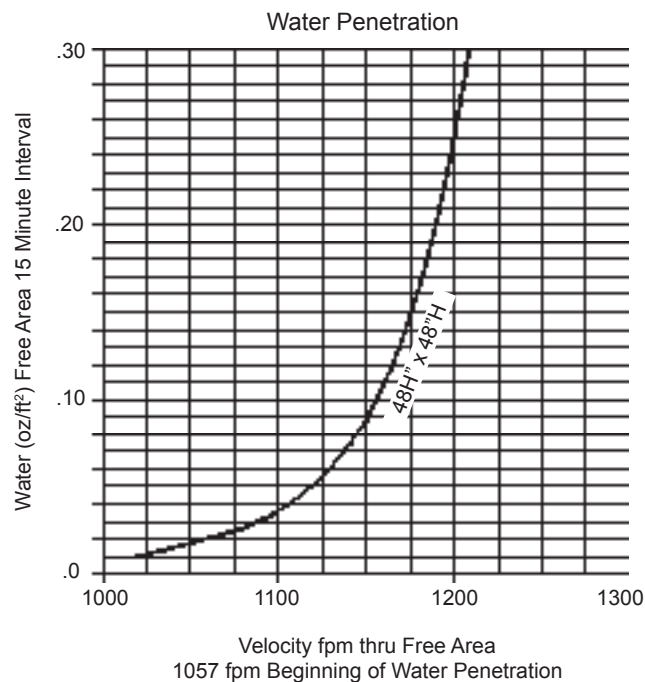
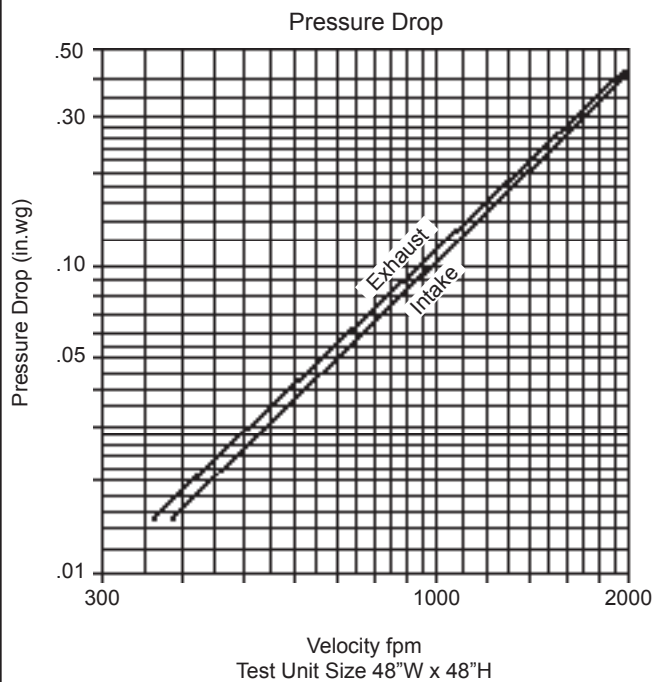
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MODEL GAC1212

12" Deep • 12" Blade Spacing • Galvanized Steel Acoustical Louver

Ratings do not include the effect of birdscreen.

**Sound Transmission Loss**

Octive Band	1	2	3	4	5	6	7	8
Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Sound Transmission Loss (db)	8	8	7	9	13	15	12	10
Free Field Noise Reduction	14	14	13	15	19	21	18	16

Attenuation

Distance From Louver	Octive Band Center Frequency (Hz)							
	1	2	3	4	5	6	7	8
	63	125	250	500	1000	2000	4000	8000
0	14	14	13	15	19	21	18	16
10	26	26	25	27	31	33	30	28
50	40	40	39	41	45	47	44	42
100	46	46	45	47	45	53	50	48
200	52	52	51	53	53	59	56	54
500	60	60	59	61	65	67	64	62
1000	66	66	65	67	71	73	70	68

The Attenuation Chart is a combination of the model GAC1212 sound transmission loss and the reduction of sound energy as a function of distance.

Free Area sq.ft.

		Width								
		12"	18"	24"	30"	36"	42"	48"	54"	60"
Height	24"	0.27	0.45	0.63	0.81	0.98	1.16	1.34	1.52	1.70
	36"	0.54	0.90	1.25	1.61	1.97	2.33	2.69	3.04	3.40
	48"	0.81	1.34	1.88	2.42	2.95	3.49	4.03	4.56	5.10
	60"	1.07	1.79	2.51	3.22	3.94	4.65	5.37	6.09	6.80
	72"	1.34	2.24	3.13	4.03	4.92	5.82	6.71	7.61	8.50
	84"	1.61	2.69	3.76	4.83	5.91	6.98	8.06	9.13	10.20
	96"	1.88	3.13	4.39	5.64	6.89	8.14	9.40	10.65	11.90

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FABRICATED GALVANIZED, 12" DEEP, HEAVY GAUGE, ACOUSTICAL FIXED TYPE BLADE

MODEL GAC-1215 STANDARD SPECIFICATIONS

FRAME: 12" DEEP, 16 GAUGE GALVANIZED STEEL.

BLADES: 20 GAUGE GALVANIZED STEEL (NON NOISE SIDE).
22 GAUGE PERFORATED GALVANNEALED STEEL (NOISE SIDE).

INSULATION: WATER RESISTANT SOUND ABSORBING MATERIAL

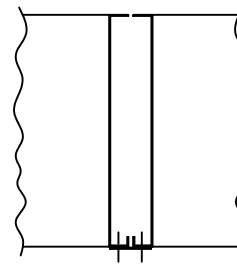
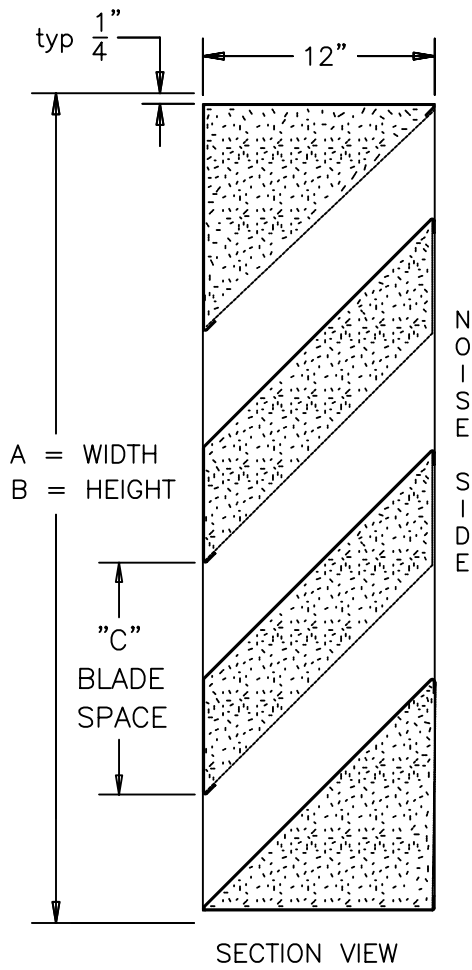
FINISH: MILL.

SCREEN: 1/2" REMOVABLE EXPANDED ALUMINUM BIRD SCREEN, LOCATED ON INTERIOR (NOISE SIDE).

MAXIMUM PANEL SIZE : 72" x 96".

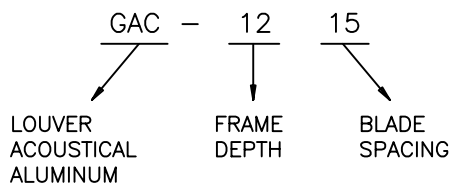
MINIMUM PANEL SIZE : 12" x 36".

DIMENSIONS: "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING SIZES. LOUVERS ARE MADE 1/2" UNDERSIZE.



MODEL No.	"C" BLADE SPACE
GAC-1215	15"

LOUVER MODEL No. DESCRIPTION



STC CLASS 10

OCTAVE BAND	1	2	3	4	5	6	7	8
FREQUENCY (Hz)	63	125	250	500	1K	2K	4K	8K
TRANSMISSION LOSS (db)	2	6	6	9	12	11	9	11
FREE FIELD NOISE REDUCTION (db)	8	12	12	15	18	17	15	17

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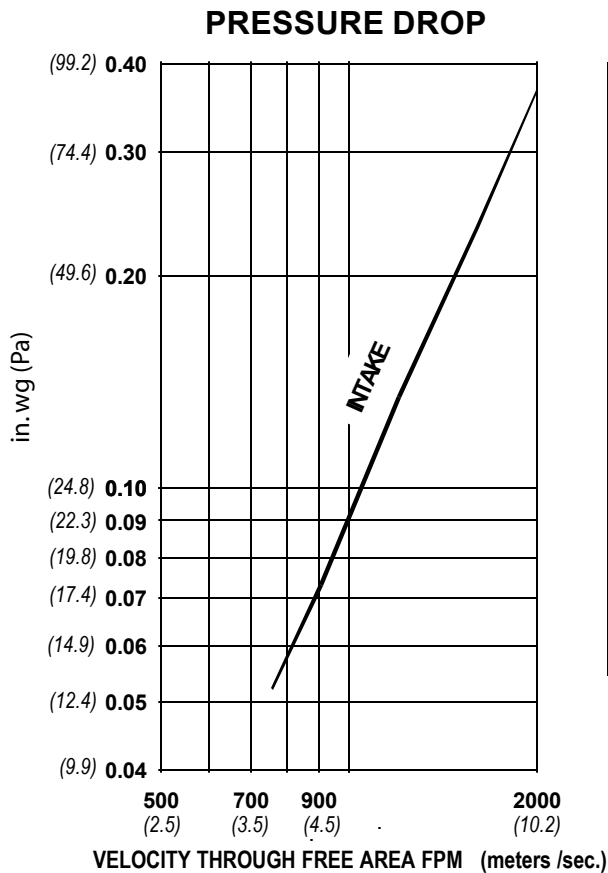
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Phone (419) 865-5000

FLORENCE, KY
Fax (419) 865-1375

GAC-1215 ACOUSTICAL LOUVER

DRN. BY	ESS	DWG. NO.	REV.
DATE	12-19-00	GAC-1215	

Pressure Drop : .13 in. wg. (32.25 Pa.) at 1173 fpm (5.95 m/s) and 4129 SCFM (1.73 scm/s)
Free Area



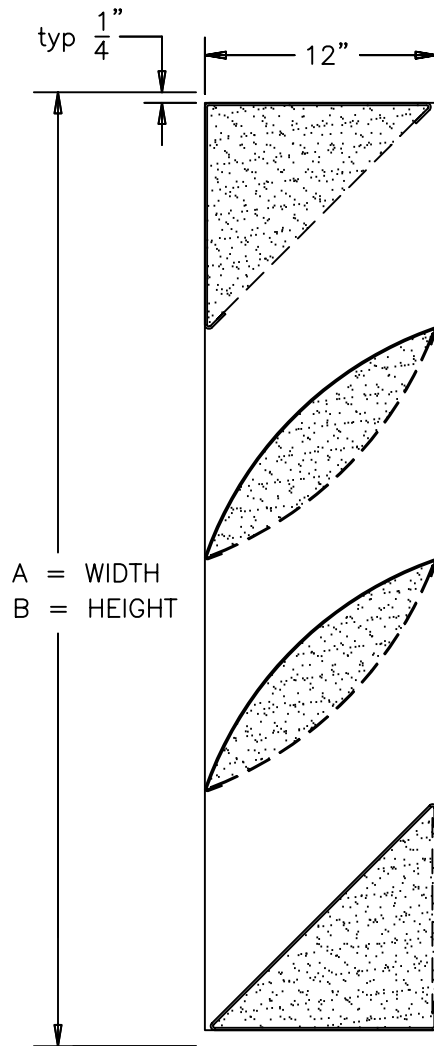
standard air - .075 lbs. per cu. ft.
 Ratings do not include the effect of a bird screen

FREE AREA IN SQUARE FEET (sq. meters)									
		WIDTH							
	in.	12	24	30	36	42	48	54	60
	mm	304	609	762	914	1066	1219	1371	1524
HEIGHT	31	0.61	1.38	1.77	2.16	2.54	2.93	3.31	3.70
	787	0.06	0.13	0.16	0.20	0.24	0.27	0.31	0.34
	36	0.80	1.82	2.33	2.83	3.34	3.85	4.36	4.86
	914	0.07	0.17	0.22	0.26	0.31	0.36	0.40	0.45
	48	1.15	2.61	3.34	4.07	4.80	5.53	6.26	6.99
	1219	0.11	0.24	0.31	0.38	0.45	0.51	0.58	0.65
	60	1.37	3.10	3.96	4.83	5.69	6.56	7.42	8.29
	1524	0.13	0.29	0.37	0.45	0.53	0.61	0.69	0.77
	72	1.65	3.73	4.77	5.81	6.85	7.89	8.93	9.97
	1828	0.15	0.35	0.44	0.54	0.64	0.73	0.83	0.93
84	2.06	4.66	5.96	7.26	8.56	9.86	11.16	12.46	
2133	0.19	0.43	0.55	0.67	0.80	0.92	1.04	1.16	
96	2.06	4.66	5.96	7.26	8.56	9.86	11.16	12.46	
2438	0.19	0.43	0.55	0.67	0.80	0.92	1.04	1.16	

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height with a single panel. Unusually high wind loading may require structural supports on non-multiple wide and multiple high assemblies. **Structural supports and mounting accessories are not supplied as a standard.**

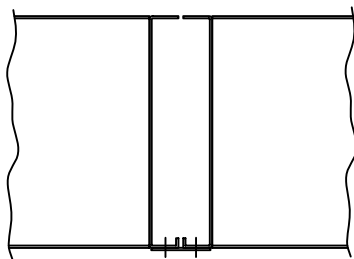
GAC-1215 Acoustical Louver

FABRICATED GALVANIZED, 12" DEEP, AIRFOIL BLADE, HEAVY GAUGE, ACOUSTICAL FIXED TYPE BLADE



A = WIDTH
B = HEIGHT

SECTION VIEW



STANDARD VERTICAL
MULLION

MODEL GAC-12AF STANDARD MATERIAL SPECIFICATIONS

- FRAME: 12" DEEP, 16 GAUGE GALVANIZED STEEL.
- BLADES: 20 GAUGE GALVANIZED STEEL (NON NOISE SIDE).
22 GAUGE PERFORATED GALVANNEALED STEEL (NOISE SIDE)
- INSULATION: WATER RESISTANT SOUND ABSORBING MATERIAL.
- SCREEN: 1/2" REMOVABLE EXPANDED ALUMINUM BIRD SCREEN LOCATED ON INTERIOR.
- FINISH: MILL.

NOTES

- 1) DIMENSIONS "A" (WIDTH) AND "B" (HEIGHT) ARE OPENING SIZES, LOUVERS ARE MADE 1/2" UNDERSIZE.
- 2) MULTI-WIDE BY MULTI-HIGH LOUVERS REQUIRE ADDITIONAL STRUCTURAL SUPPORT AT VERTICAL MULLION ON INTERIOR SIDE OF LOUVER, NOT SUPPLIED BY ABI.
- 3) MULTIPLE PANEL LOUVER UNITS WILL BE SHIPPED UNASSEMBLED FOR EASE OF INSTALLATION.
- 4) MAXIMUM PANEL SIZE: 72 x 96
MINIMUM PANEL SIZE: 12 x 30

Model GAC-12AF

Octave Bands	1	2	3	4	5	6	7	8
Frequency (Hz)	63	125	250	500	1K	2K	4K	8K
Free Field Noise Reduction (db)	14	12	14	19	21	19	16	15

THE LOUVER MODEL GAC-12AF HAS RECEIVED A CERTIFIED STC RATING OF 13

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7435 INDUSTRIAL RD.
Phone (859) 538-3400

FLORENCE, KY
Fax (859) 647-7810

GAC-12AF ACOUSTICAL LOUVER

DRN. BY ESS

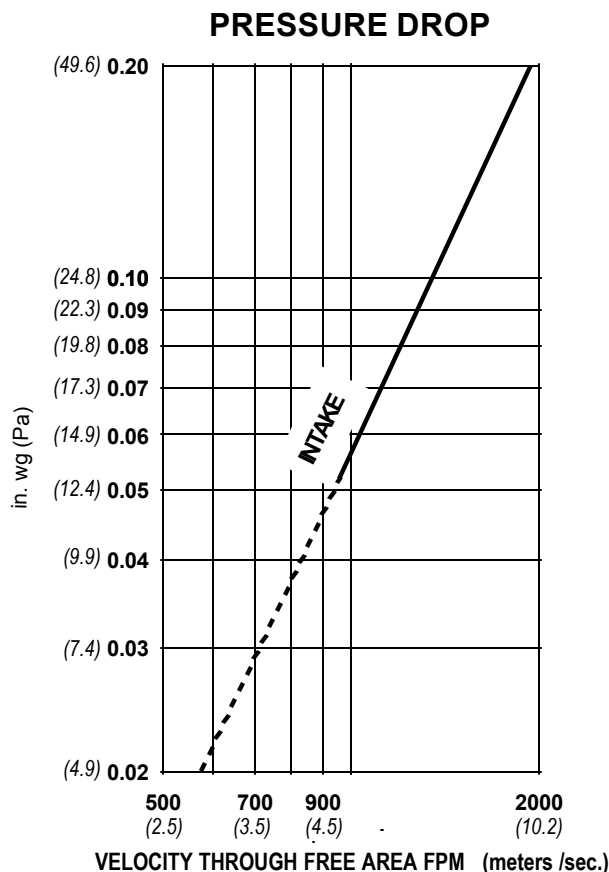
DATE 10-05-06

DWG. NO.

GAC-12AF

REV.

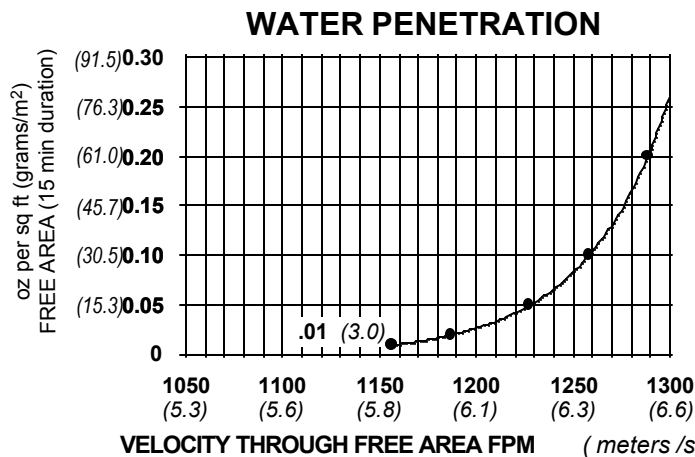
Water Penetration : .01 oz. (3.0 g.) at 1156 fpm (5.87 m/s) recommended free area velocity
Pressure Drop
Free Area : 3.83 sq.ft. (0.355 sq. m.) = 24% for 48" x 48" (1.22 m x 1.22 m) test size



standard air - .075 lbs. per cu. ft.
Ratings do not include the effect of a bird screen

This product was tested in accordance
with AMCA Standard 500L.

FREE AREA IN SQUARE FEET (sq. meters)										
		WIDTH								
	in.	12	24	30	36	42	48	54	60	
	mm	304	609	762	914	1066	1219	1371	1524	
HEIGHT	24	0.36	0.82	1.05	1.28	1.51	1.74	1.97	2.20	
	609	0.03	0.08	0.10	0.12	0.14	0.16	0.18	0.20	
	36	0.58	1.31	1.67	2.04	2.40	2.76	3.13	3.49	
	914	0.05	0.12	0.16	0.19	0.22	0.26	0.29	0.32	
	48	0.80	1.81	2.32	2.82	3.33	3.83	4.34	4.84	
	1219	0.07	0.17	0.22	0.26	0.31	0.36	0.40	0.45	
	60	1.01	2.30	2.94	3.58	4.22	4.86	5.50	6.14	
	1524	0.09	0.21	0.27	0.33	0.39	0.45	0.51	0.57	
	72	1.24	2.80	3.58	4.36	5.14	5.92	6.71	7.49	
	1828	0.11	0.26	0.33	0.41	0.48	0.55	0.62	0.70	
	84	1.45	3.28	4.20	5.12	6.03	6.95	7.87	8.78	
	2133	0.13	0.31	0.39	0.48	0.56	0.65	0.73	0.82	
96	1.67	3.79	4.85	5.90	6.96	8.02	9.08	10.13		
2438	0.16	0.35	0.45	0.55	0.65	0.75	0.84	0.94		



Both maximum recommended free area velocity and beginning of water penetration are **1156 fpm** at standard air - .075 lbs. per cu. ft.
The above water penetration data is based on mill finish, 48" x 48" test size per AMCA Standard 511.

Below is an explanation of how to use the AMCA performance data for the recommended free area velocity of 1156 (5.87 m/s).

Step #1: Divide the required CFM flow by the maximum recommended free area velocity.

Step #2: Select the most desirable louver size, from the free area table, that meets the minimum free area requirement.

Step #3: Compare specified performance to the certified water penetration and pressure drop ratings.

Openings that require multiple louver panels in both width and height will require internal structural supports. It is recommended that large openings be divided with structural members so that the louvers will span either width or height with a single panel. Unusually high wind loading may require structural supports on non-multiple wide and multiple high assemblies. **Structural supports and mounting accessories are not supplied as a standard.**

Example: Given 5,000 CFM design flow

Step #1:

$$\text{min. free area} = \frac{\text{Design CFM}}{\text{Max. Recommended Velocity}} = \frac{5,000}{1156} = 4.32 \text{ sq. ft.}$$

Step #2: From the free area table above the approximate louver size is **54" x 48"** = (4.34 sq. ft.)

MODEL AAC73A

7" Deep • Stationary and Adjustable Insulated Blade • Galvanized Steel • Acoustical Louver

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 16-GA galvanized steel

BLADE: 18-GA galvanized steel stationary blade; 18-GA galvanized steel adjustable blade, double thickness, 1" thick with 8 lb density mineral wool insulation sandwiched between metal skins separated by a thermal break, mechanically fastened together

FACE OF LOUVER: Full head and sill with blade and jambs contained within

LINKAGE: 12-GA zinc plated steel brackets; pivots are 1/2" dia. machined steel, zinc plated and chromate treated, pivots rotate in a celcon bearing; A 5/16" dia. aluminum linkage rod is locked to the pivot by a 1/4" - 20 set screw with an epoxy locking patch

SEALS: Neoprene adhesive applied to blade edges and jambs

SHAFTS: 1/2" dia. plated steel stub

BEARINGS: 1/2" dia. bore oilite bronze flanged sleeve press fit into frame

FINISH: Mill

SCREEN: 1/2" mesh 19-GA galvanized steel

OPTIONS

Flange Frame

Finish - Baked Enamel, Kynar, Anodize

Screen - 1/2" Flattened Aluminum or Insect Screen

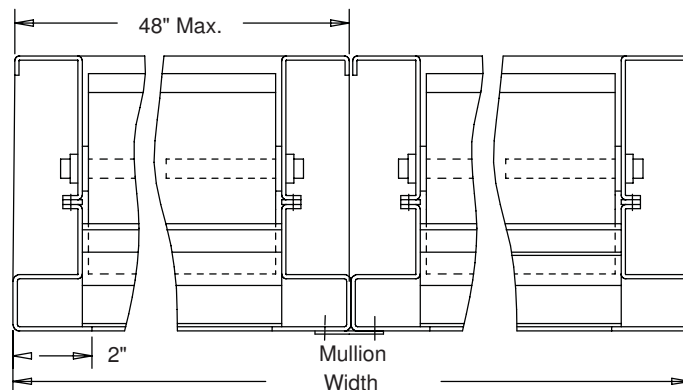
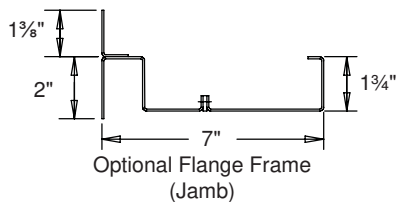
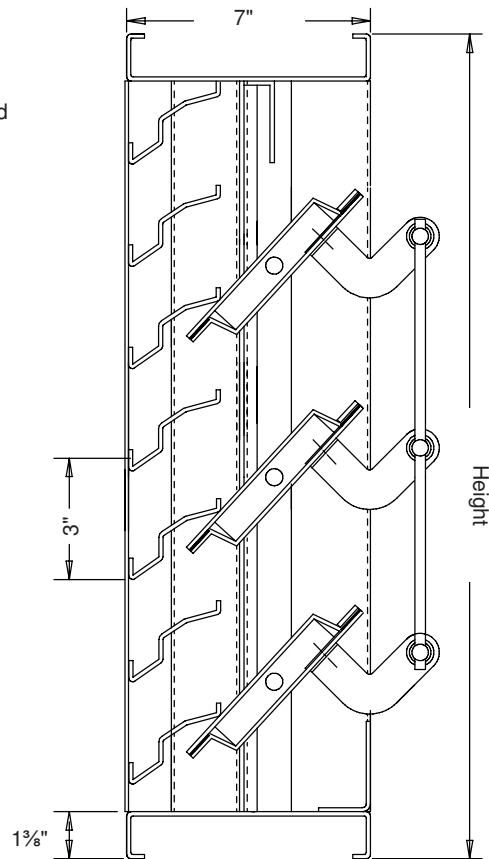
Actuators - Manual, Electric, Pneumatic

NOTES

1. "A" width and "B" height are opening dimensions. Nominal deductions will be made to the opening sizes given.

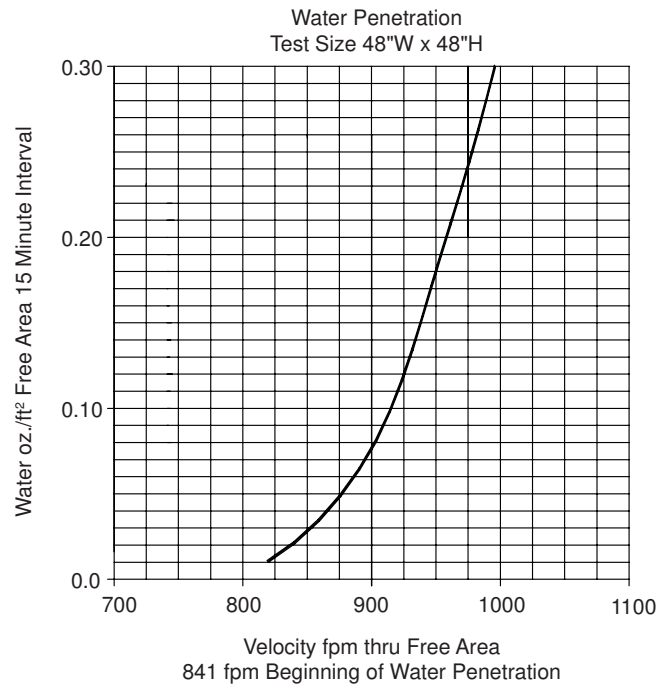
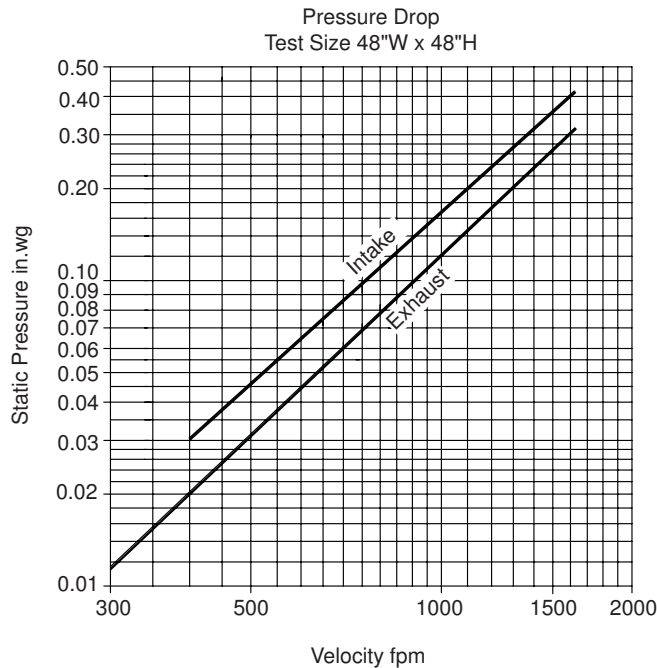
LOUVER SIZES

Panels	Min Panel	Max Single Panel
AAC73A	12"W x 14"H	48"W x 96"H



MODEL AAC73A

7" Deep • Stationary and Adjustable Insulated Blade • Galvanized Steel • Acoustical Louver



Free Area sq.ft

		Width						
Height		12	18	24	30	36	42	48
	12	.22	.38	.54	.70	.85	1.01	1.17
	24	.61	1.04	1.47	1.91	2.34	2.77	3.20
	36	1.00	1.70	2.41	3.11	3.82	4.52	5.23
	48	1.39	2.37	3.34	4.32	5.30	6.28	7.26
	60	1.77	3.03	4.28	5.53	6.78	8.04	9.29
	72	2.16	3.69	5.21	6.74	8.27	9.79	11.32
	84	2.55	4.35	6.15	7.95	9.75	11.55	13.35
	96	2.94	5.10	7.08	9.16	11.23	13.30	15.38

Thermal Characteristics
Insulating factors for the standard blade construction:

R - Value = 3.9

U - Factor = .26 BTUH per sq.ft per degree F

Acoustic Values

Octave Band / Hz	Noise Reduction dB
1/63	9
2/125	8
3/250	7
4/500	8
5/1000	10
6/2000	15
7/4000	15
8/8000	16

Attenuation chart below is a combination of the louver sound transmission loss and the reduction of sound energy as a function of distance from the noise source.

Attenuation

	Octave Band Center Frequency Hz								
Distance From Louver		1/63	2/125	3/250	4/500	5/1000	6/2000	7/4000	8/8000
	10'	15	14	13	14	14	17	18	20
	50'	29	28	27	28	28	31	32	34
	100'	35	34	33	34	34	37	38	40
	200'	41	40	39	40	40	43	44	46
	500'	49	48	47	48	48	51	52	54
	1000'	55	54	53	54	54	54	57	60

Steel Control Dampers

- AC111 — 3½" Deep, Rectangular, Steel Balancing Damper w/Quad
- AC112 — 3½" Deep, Round, Steel Balancing Damper w/Quad
- AB1/2 — 5½" Deep, Single Thickness, Steel Control Damper w/Quad
- AC1/2 — 5½" Deep, Single Thickness, Steel Control Damper
- AC530 — 10" Deep, Double Thick Blade w/Seals, Steel Control Damper
- AC515/516 — 5½" Deep, Airfoil Blade, Steel Control Damper
- AC411 — 8" Deep, Single Thickness Blade, Galvanized Steel Control Damper
- AC561-1 — 5" Round Volume Control, 3" thru 11" Diameter
- AC561-2 — 5" Round Volume Control, 12" thru 60" Diameter
- ID30 — 4" Deep, Airfoil Blade, 250°F Max Temp.
- ID41 — 4" Deep, Single Thickness Blade, 250°F Max Temp.
- ID42 — 10" Deep, Single Thickness Blade, Up to 8 in.wg
- ID43 — 4" Deep, Single Thickness Blade, Up to 10 in.wg
- ID50 — 10" Deep, Airfoil Blade, 450°F Max Temp., Up to 12 in.wg
- ID51 — 10" Deep, Airfoil Blade, 450°F Max Temp., Up to 20 in.wg
- ID54 — 10" Deep, Airfoil Blade, 800°F Max Temp., Up to 15 in.wg
- ID55 — 10" Deep, Airfoil Blade, 400°F Max Temp.,
- AC580 — True Round, Single Thickness Blade, 250°F Max. Temp.
- AC581 — True Round, Single Thickness Blade, 250°F Max. Temp.

- Supplemental Info — Control Panel & Jackshaft Arrangements
- Supplemental Info — Face & Bypass Configurations
- Installation Instructions — Extended Shaft Kit
- Installation Instructions — 2" Standoff Shaft Kit
- Installation Instructions — Multi-Blade Control and Balancing Dampers

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Heavy Duty Backdraft Dampers

Heavy Duty Backdraft Dampers are designed to permit air flow in one direction at a specified pressure and to prevent a reverse air flow. Field-adjustable counterweights are available for pre-determined opening pressures.

BID4 “Tear Drop” Design

To 10 in.wg Static Pressure at 6000 fpm

Standard Specifications

Frame: 10-GA galvanized steel

Blades: 16-GA galvanized steel tear drop

Bearings: Bronze Oilite

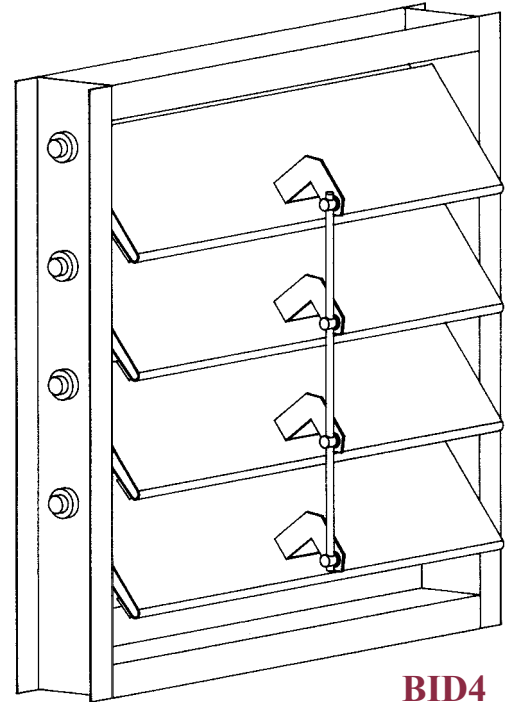
Axle: 3/4" dia. steel; Full length of blade

Seals: Polyurethane on blade edges; none at jambs

Linkage: 1/8" thick plated steel bracket with 1/2" dia. plated steel pivot riding in a celcon sleeve bearing; Linkage rod is 5/16" dia. aluminum locked to pivot with a 1/4"-20UNC plated steel set screw; Single for panels < 20" wide; Double for panels ≤ 20" wide

Counterweights: Adjustable; To assist or resist opening

Max. Temp.: 180°F



BID4

BID9 “Tear Drop” Design

For Extra Heavy-Duty Applications

Standard Specifications

Frame: 2" x 10" x 2" 12-GA galvanized steel channel

Blades: .080" thick 6063-T52/T6 extruded aluminum tear drop; 6" wide

Bearings: Ball bearings pressed into frame

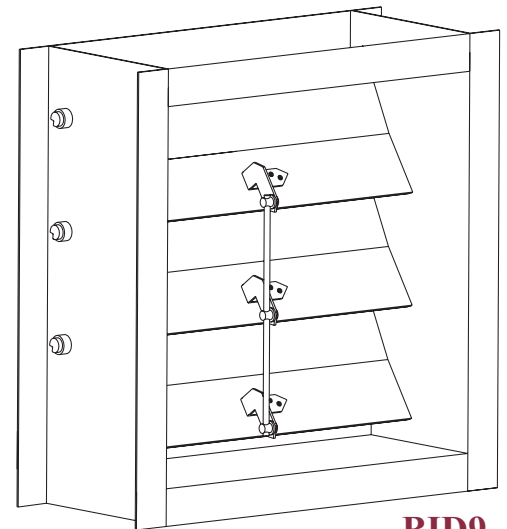
Axle: 3/4" diameter steel, with positively locked to blade

Linkage: 1/8" thick plated steel bracket with 1/2" dia. plated steel pivot riding in a celcon sleeve bearing; Linkage rod is 5/16" dia. aluminum, locked to pivot with a 1/4"-20UNC plated steel set screw

Seals: Silicone seals on blade ends; None at jambs

Counterweights: Adjustable; To assist or resist opening

Max Temp.: 190°F



BID9

Performance Data (dampers with assist counterweights)

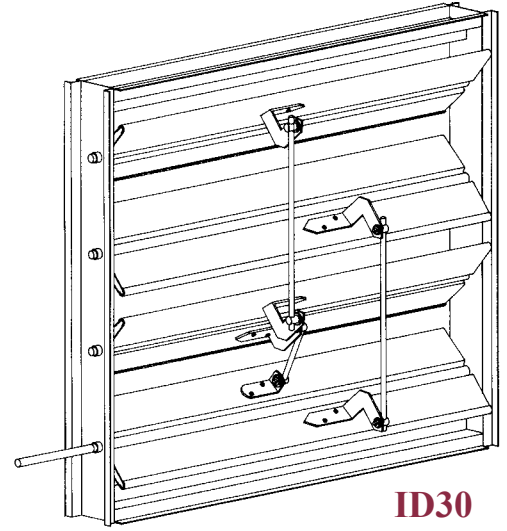
	Without Duct				With Duct			
	Start Open		Full Open		Start Open		Full Open	
Model	Face Velocity	Pressure Drop	Face Velocity	Pressure Drop	Face Velocity	Pressure Drop	Face Velocity	Pressure Drop
BID4	100 fpm	.20 in.wg	5000 fpm	5.8 in.wg	30 fpm	.10 in.wg	5000 fpm	1.5 in.wg
BID9	100 fpm	.05 in.wg	3500 fpm	2.4 in.wg	150 fpm	.05 in.wg	3500 fpm	.40 in.wg

Heavy Duty Dampers

ID30 To 12 in.wg Static Pressure
Reduction in blade lengths increases static pressure limits

Standard Specifications

Frame: 16-GA galvanized steel 4" deep "Hat-Shaped" frame
Blades: 16-GA galvanized steel airfoil; 8" wide max.
Shaft: ½" dia. plated steel shaft full length
Bearings: Stainless steel flanged sleeve, press fit into frame
Linkage: Face mounted, located in the airstream; Formed bracket of ⅛" thick steel; Trunnion is a machined pivot of plated steel with a ⅝" dia. rod
Actuator: 6" extended shaft
Finish: Mill
Max. Temp.: 250°F; consult factory for temp. > 250°F

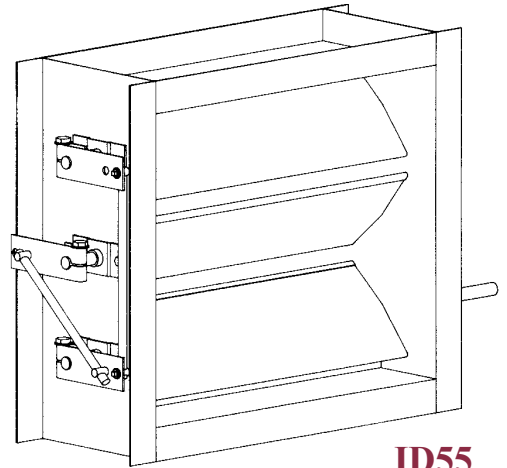


ID30

ID55 To 10 in.wg Static Pressure
Fan Discharge Damper
For clean Air Applications only

Standard Specifications

Frame: 2" x 10" x 2" 12-GA galvanized steel formed channel frame
Blades: .080 extruded aluminum airfoil blade; 8" wide
Shaft: ¾" dia. plated steel stub shaft with a positive interlock into blade section
Linkage: 12-GA formed galvanized steel; Trunnion is a machined pivot of plated steel with a ½" dia. plated steel interconnecting rod
Bearings: Sintered stainless steel oilite flanged sleeve bolted to frame
Actuator: Manual or motor
Finish: Mill
Max. Temp.: 400°F



ID55

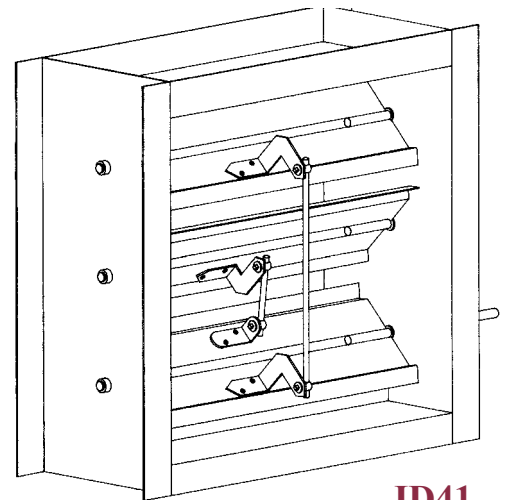
ID41 To 6 in.wg Static Pressure at 2500 fpm

ID42 To 8 in.wg Static Pressure at 2500 fpm

ID43 To 10 in.wg Static Pressure at 2500 fpm
Velocities above 2500 to 4000 fpm (max.) require a double set of face linkage

Standard Specifications

Frame: 2" x 10" x 2" 12-GA galvanized steel, formed channel frame
Blades: 12-GA galvanized steel, pressure formed singled thickness; 6¾" - 9¾" wide
Shaft: Corrosion resistant; Plated cold finished steel ½" or ¾" dia.
Bearings: Bronze oilite flanged sleeve pressed into frame
Linkage: Chevron type formed bracket of ⅛" thick steel; Trunnion is a machined pivot of plated steel with ⅝" dia. rod
Actuator: Manual or Motor
Finish: Mill
Max. Temp.: 250°F



ID41

Performance Data

Model	Damper Width	System Pressure	System Velocity	Pressure Drop Full Open	Leakage with Seals
ID30	48"	12"	4000 fpm	.50 in.wg	25.2 cfm/sq.ft.
ID55	60"	10"	4000 fpm	.42 in.wg	15.0 cfm/sq.ft.
ID41, ID42, ID43	48"	10"	2500 fpm	.28 in.wg	30.1 cfm/sq.ft.

Heavy Duty Dampers

ID50 To 12 in.wg Static Pressure

ID51 To 20 in.wg Static Pressure

Standard Specifications

Frame: 2" x 10" x 2" 12-GA galvanized steel formed channel frame

Blades: 16-GA galvanized steel airfoil for dampers < 48" wide; 12-GA for dampers ≥ 48" wide; 6" - 9¾" wide

Shaft: Corrosion resistant; Plated cold finished steel

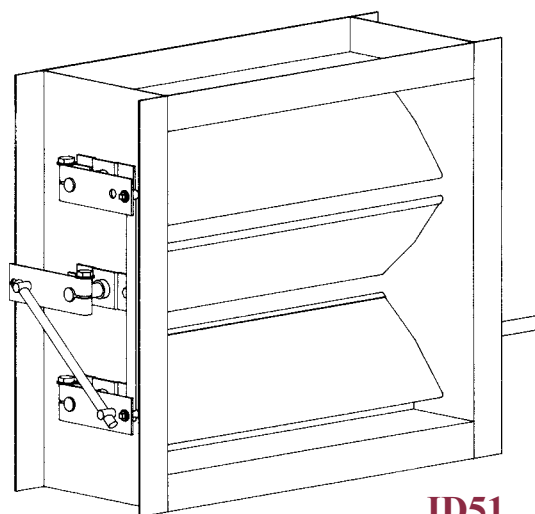
Bearings: Stainless steel flanged sleeve, bolted to frame

Linkage: ½" dia. interconnecting rod with trunnion pivot fastener; Located in jambs

Actuator: Manual or motor

Finish: Mill

Max. Temp.: 450°F; Consult factory for temp. > 450°F



ID51

Performance Data (48"W x 48"H Damper)					
Model	Damper Width	System Pressure	System Velocity	Pressure Drop Full Open	Leakage with Seals
ID50	60"	1"	4000 fpm	.30 in.wg	5.5 cfm/sq.ft.
	60"	4"	4000 fpm	.30 in.wg	12.6 cfm/sq.ft.
	60"	8"	4000 fpm	.30 in.wg	19.8 cfm/sq.ft.
	60"	12"	4000 fpm	.30 in.wg	28.0 cfm/sq.ft.
ID51	60"	1"	4000 fpm	.30 in.wg	4.8 cfm/sq.ft.
	60"	5"	4000 fpm	.30 in.wg	10.6 cfm/sq.ft.
	60"	10"	4000 fpm	.30 in.wg	15.4 cfm/sq.ft.
	60"	15"	4000 fpm	.30 in.wg	18.8 cfm/sq.ft.
	60"	20"	4000 fpm	.30 in.wg	21.7 cfm/sq.ft.

ID54 To 15 in.wg Static Pressure

Temperatures to 800°F

Standard Specifications

Frame: 2" x 10" x 2" 10-GA hot roll formed channel frame

Blades: 10-GA galvanized airfoil; 6" - 9¾" wide

Shaft: 1" dia. cold finished steel

Bearings: Ball bearings mounted on stand-off bracket

Linkage: ½" dia. interconnecting rod with trunnion pivot fastener; Located in jamb

Actuator: Manual or Motor

Finish: Mill

Max. Temp.: 800°F; Consult factory for temp. > 800°F



ID54

Actuators

abi offers a variety of actuators to meet the requirements of heavy duty applications. They include manual, electric, pneumatic and hydraulic operators. Functions can be as simple as two-position, spring return or very complex, modulating fail safe operation. Accessories such as auxiliary switches, maintenance lock outs or remote position indication can be incorporated.

Heavy Duty Round Dampers

AC580 To 12 in.wg Static Pressure

AC581 To 20 in.wg Static Pressure

Standard Specifications

Frame: Fabricated steel channel; Channel depth equal to blade diameter of 10" or less

Blades: Single thickness with reinforcing gussets welded to blade parallel to air flow as required

Shaft: Plated steel continuous length welded to blade

Bearings: Sintered stainless steel flanged sleeve pressed in the frame

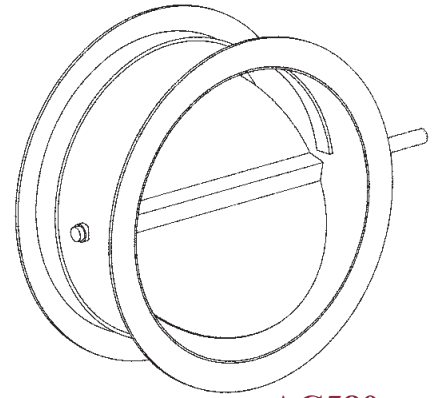
Stop: 1/4" x 1/4" metal bar for sizes < 12" dia.

1/4" x 1/2" metal bar for sizes ≥ 12" dia.

Actuator: Extended shaft 6" long beyond frame flanges

Finish: Mill

Max. Temp.: 250°F; Consult factory for temp. > 250°F



AC580



AC580

Performance Data (48" dia. Damper Size) Dampers with Low Leakage System

Model	Damper Width	Systems Pressure	System Velocity	Pressure Drop Full Open	Leakage
AC580	48"	1"	4000 fmp	.05 in.wg	.0005 cfm/sq.ft.
	48"	4"	4000 fmp	.05 in.wg	.18 cfm/sq.ft.
	48"	8"	4000 fmp	.05 in.wg	.24 cfm/sq.ft.
AC581	48"	1"	7000 fmp	.18 in.wg	.0005 cfm/sq.ft.
	48"	5"	7000 fmp	.18 in.wg	.20 cfm/sq.ft.
	48"	10"	7000 fmp	.18 in.wg	.27 cfm/sq.ft.
	48"	15"	7000 fmp	.18 in.wg	.34 cfm/sq.ft.

Model **AC580** Maximum Static Pressure 12 in.wg

Inside Diameter		Frame		Blade Thickness	Shaft Diameter
Above	Through	Depth	Flange		
6"	12"	10-GA	1" x 11-GA to 6" dia. 1 1/8" x 11-GA to 8" dia. 1 1/4" x 11-GA to 9" dia. 1 3/8" x 11-GA to 10" dia. 1 1/2" x 11-GA to 12" dia.	12-GA	1/2"
12"	24"	10" 10-GA	1 1/2" x 1 1/2" x 3/16" to 24" dia.	10-GA	3/4"
24"	48"	10" 10-GA	1 1/2" x 1 1/2" x 3/16" to 26" dia. 2" x 2" x 3/16" to 48" dia.	10-GA to 36" dia. 10-GA with 2 gussets	1"

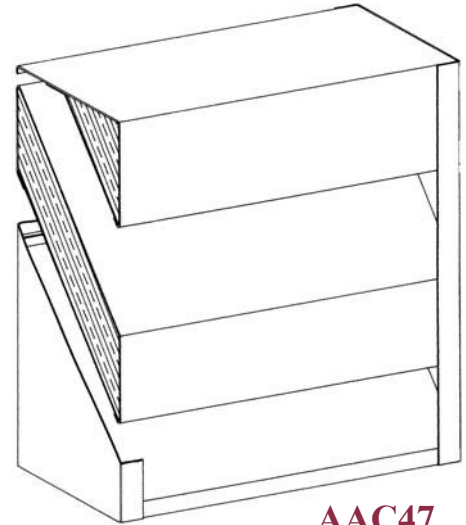
Model **AC581** Maximum Static Pressure 20 in.wg

Inside Diameter		Frame		Blade Thickness	Shaft Diameter
Above	Through	Depth	Flange		
6"	10"	10-GA	1" x 11-GA to 6" dia. 1 1/8" x 10-GA to 8" dia. 1 1/4" x 10-GA to 9" dia.	10-GA	1/2"
10"	12"	10" 10-GA	1 3/8" x 10-GA to 11" dia. 1 1/2" x 10-GA to 12" dia.	10-GA	3/4"
12"	24"	10" 10-GA	1 1/2" x 1 1/2" x 3/16" to 24" dia.	7-GA	1"
24"	36"	10" 10-GA	1 1/2" x 1 1/2" x 3/16" to 26" dia.	7-GA with 2 gussets	1"
36"	48"	10" 10-GA	2" x 2" x 3/16" to 48" dia.	7-GA with 3 gussets	

Acoustical Louvers

AAC47 Formed Steel Acoustical Louver Standard Specifications

- Frame: 16-GA galvanized steel; 4" deep
- Blades: 18-GA galvanized steel on exterior with 22-GA galvanized perforated steel on interior surface
- Insulation: Sound insulation
- Construction: Riveted and or welded, with head, sill, and blades contained within jambs
- Finish: Mill



AAC47

The **abi AAC47** acoustical louver low frequency and high frequency sound performance data is presented in two separate tables. Review the appropriate table and select the attenuation value for the design noise criteria corrective action required.

AAC47 LF (Low Frequency)

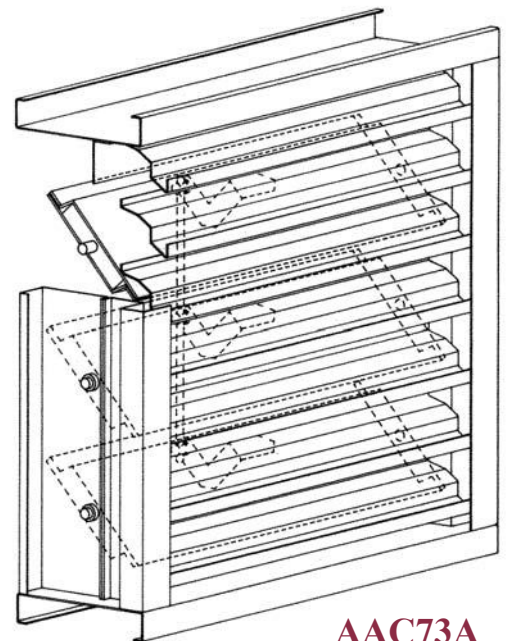
Octave Band/Frequency	1/63	2/125	3/250	4/500	5/1000	6/2000	7/4000	8/8000
Free Field of Noise Reduction (db)	12	14	12	12	9	11	13	15

AAC47 HF (High Frequency)

Octave Band/Frequency	1/63	2/125	3/250	4/500	5/1000	6/2000	7/4000	8/8000
Free Field of Noise Reduction (db)	8	7	9	10	14	16	16	18

AAC73A Formed Steel Combination Acoustical Blade Louver Standard Specifications

- Frame: 16-GA galvanized steel; 7" deep
- Stationary Blades: 18-GA galvanized steel
- Adjustable Blades: 18-GA galvanized steel double thickness, 1" thick with 8lb. density mineral wool insulation sandwiched between metal skins separated by a thermal break, mechanically fastened together
- Face of Louver: Full head and sill with blade and jambs contained within
- Linkage: Brackets are 12-GA zinc plated steel, pivots are 1/2" machined steel, zinc plated and chromate treated. Pivots rotate in a celcon bearing 5/16" dia. aluminum linkage rod is locked to the pivot by a 1/4 - 20 set screw with an epoxy locking patch
- Seals: Neoprene adhesive applied to blade edges and jambs
- Shafts: 1/2" dia. plated steel stub
- Bearings: 1/2" bore oilite bronze flanged sleeve, press fit into frame
- Screen: 1/2" square mesh 19-GA galvanized steel; Secured to the exterior
- Finish: Mill



AAC73A

Acoustical values for noise reduction shall not be less than:

63	125	250	500	1000	2000	4000	8000
9	8	7	8	10	15	15	16

And provide a "U" .26 BTU per hour per sq.ft. per degree F° thermal characteristics.

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In the interest of product development, **abi** reserves the right to make changes without notice.

MODEL AC111

3½" Deep • Single Thickness Blade • Steel Balancing Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 3½" x 5⁄8" x 16-GA galvanized steel hat channel

BLADE: 20-GA galvanized steel, single thickness blade

BEARINGS: Nylon

AXLES: 3⁄8" dia. plated steel stub, with lanced retainers

ACTUATOR: 3⁄8" square manual locking quadrant, shipped loose

OPTIONS

16-GA Blade

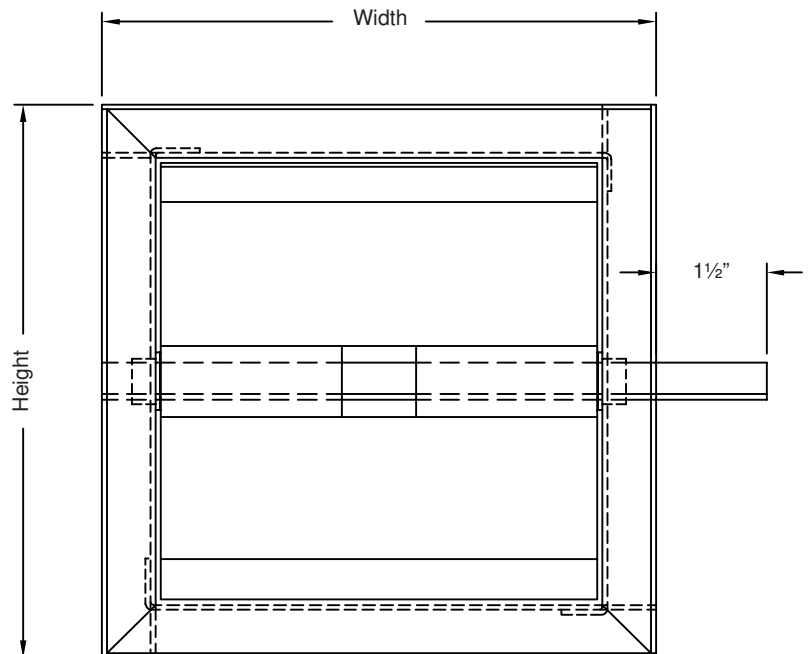
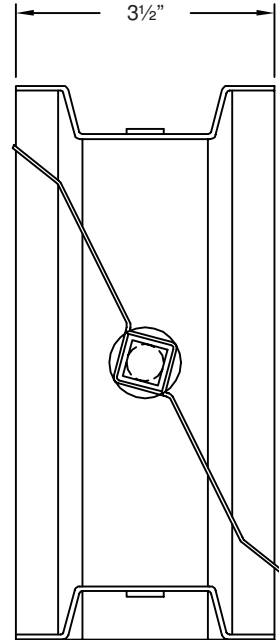
2" Stand-Off Kit

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided ¼" undercut.
2. Dampers can only be ordered in 1" increments.
3. This model is not recommended for motorized applications.
4. AC111 has only one blade and will extend into the airstream in most cases.
5. Maximum face velocity is 1500 fpm. Maximum differential pressure is 1 in.wg.
6. Dampers may be mounted vertically or horizontally.

DAMPER SIZES

Panels	Min Panel	Max Single Panel
AC111	6"W x 4"H	36"W x 12"H



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MODEL AC111

3½" Deep • Single Thickness Blade • Steel Balancing Damper

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MODEL AC112

4½" Deep • Single Thickness Blade • Round Steel Balancing Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 4½" x 20-GA galvanized steel hat channel for dampers ≤ 18" dia.; Dampers ≥ 19" are 20-GA with reinforcing beads or 18-GA galvanized steel.

BLADE: Galvanized steel, single thickness blade
22-GA for dampers 4" to 12" dia.
20-GA for dampers 13" to 18" dia.
18-GA for dampers 19" to 24" dia.

BEARINGS: Nylon

AXLES: ⅜" square plated steel stub, with lanced retainers

ACTUATOR: ⅝" square manual locking quadrant, shipped loose

OPTIONS

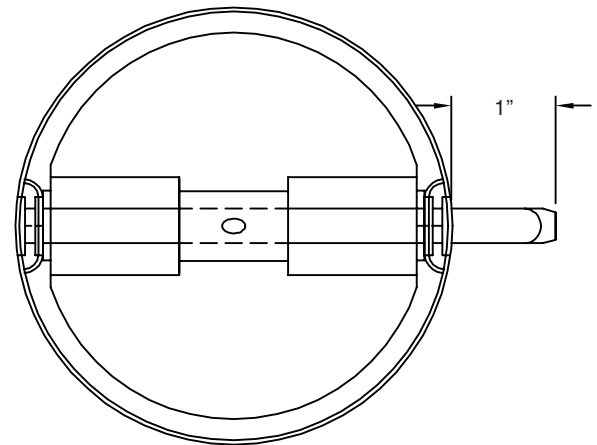
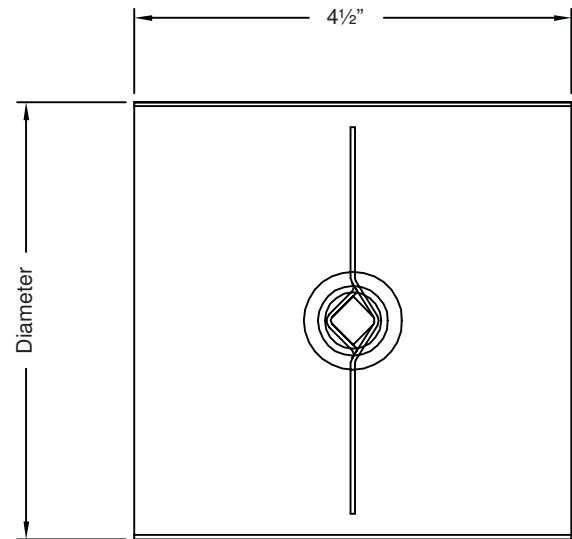
2" Stand-Off Kit

NOTES

1. "A" diameter is opening dimension. Dampers are provided ¼" undercut.
2. Dampers can only be ordered in 1" increments.
3. This model is not recommended for motorized applications.
4. AC112 has only one blade and will extend into the airstream in most cases.
5. Maximum face velocity is 1500 fpm. Maximum differential pressure is 1 in.wg.
6. Dampers may be mounted vertically or horizontally.

DAMPER SIZES

Panels	Min Panel	Max Single Panel
AC112	4" dia.	24" dia.



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MODEL AC112

4½" Deep • Single Thickness Blade • Round Steel Balancing Damper

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MODEL AB1/AB2

Single Thickness Blade • 200°F Max. Temperature • Steel Control Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7⁄8" x 16-GA galvanized steel hat channel
BLADES: 16-GA galvanized steel, 6" nominal width
AXLES: Plated steel stub
BEARINGS: Non-metallic nylon
LINKAGE: In-jamb, plated steel bar and crank plate with stainless steel pivots
STOPS: None provided, unless gap exceeds 2"; see detail
ACTUATOR: ½" dia. removable extended shaft with individual panel locking manual quadrant and gasket

OPTIONS

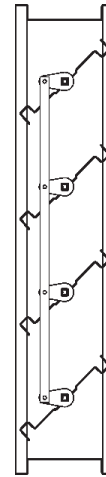
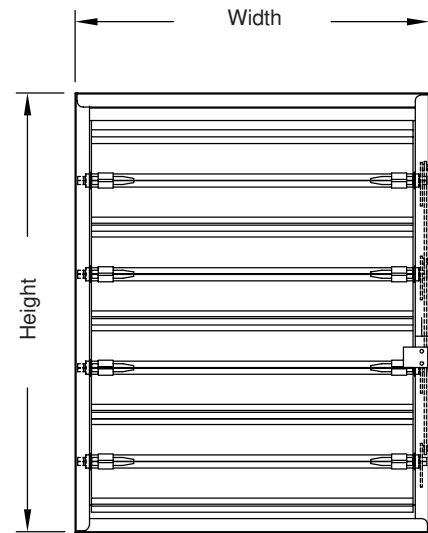
Exact Size
 Face Bypass - Vertical, or Perpendicular only
 Sleeve - Transition - Sideplate
 Material - 304 SS
 Vertical Blade
 Flange Frame - Front, Rear or Both
 SS Manual Quadrant
 2" Standoff for Manual Quadrant
 PK1200
 Retaining Angles - 1 or 2 sets
 Bearings - OIB or SS
 Security Bars

NOTES

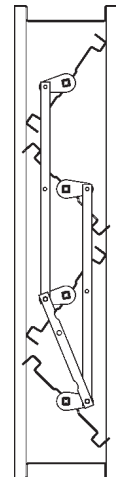
1. "A" width and "B" height are opening dimensions. Dampers are provided approximately ¼" undersize.
2. Dampers shorter than 12" are single blade.
3. If positive shut off is required, consider damper model AC1 or AC2.
4. Maximum face velocity is 2000 fpm. Maximum differential pressure is 4 in.wg.

DAMPER SIZES

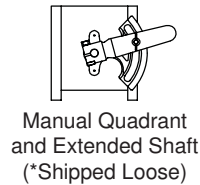
Panels	Minimum Panel	Maximum Panel
AB1 Parallel Blade	6"W x 8"H	48"W x 48"H
AB2 Opposed Blade	6"W x 12"H	48"W x 48"H



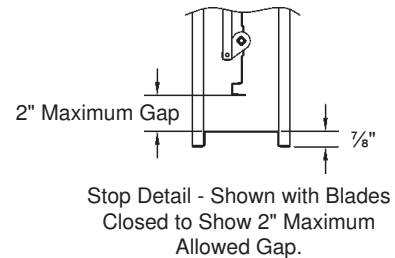
AB1
Parallel Blade



AB2
Opposed Blade



Manual Quadrant
and Extended Shaft
(*Shipped Loose)



air balance

Dampers  Louvers
 UL Life Safety Products
 Division of Mestek
 Member of AMCA

MODEL AB1/AB2

Single Thickness Blade • 200°F Max. Temperature • Steel Control Damper

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MODEL AC1/AC2

Single Thickness Blade • 200°F Max. Temperature • Parallel or Opposed • Steel Control Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7⁄8" x 16-GA galvanized steel hat channel; Flat 16-GA galvanized head and sill for maximum free area on dampers < 14" high
- BLADES:** 16-GA galvanized steel, 6" nominal width
- AXLES:** Plated steel stub
- BEARINGS:** Heavy duty molded nylon
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots, in-jamb type
- STOPS:** 18-GA galvanized steel angles at head and sill
- ACTUATOR:** ½" dia. removable extended shaft for single and double wide units; On three or more panel wide units without jackshafter, blade brackets will be the standard for external actuator for installation
- FINISH:** Mill

OPTIONS

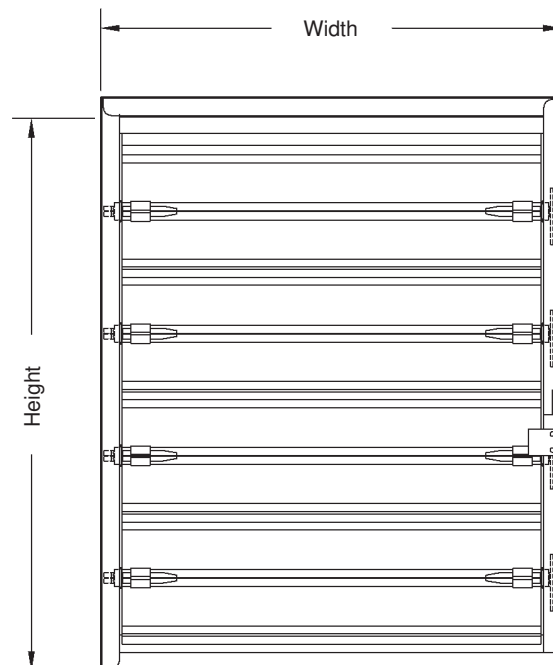
Exact Size
 Face/Bypass - Vertical, Horizontal, or Perpendicular
 Sleeve - Transition - Sideplate
 Material - 304 SS
 Vertical Blades
 Flange - Front, Rear, or Both
 Blade Seal - Vinyl, or Silicone
 Jamb Seal - Stainless Steel
 Jackshafter
 Actuators - Manual Quadrants, 120V, 24V, 230V or Pneumatic
 Position Indication Switch - PK1200, Small Aux Switch, or Integral to Actuator Transformers
 Explosion Proof Housing
 Pilot Positioner
 Copper Tubing
 Tab-Lock Retaining Angles - 1 or 2 Sets
 Bearings - OIB or Stainless Steel
 Axle - Stainless Steel
 Security Bars

NOTES

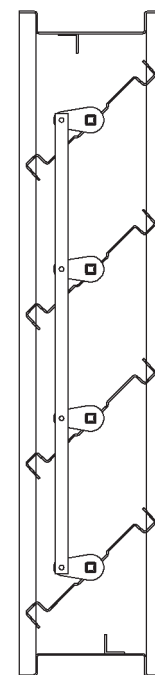
1. "A" width and "B" height are opening dimensions. Dampers are provided approximately ¼" undersize.
2. Multiple-panel units are shipped with the panels factory-assembled, to a maximum of 48ft². When jackshafter is designated, it will be installed. When it is desired to have the individual damper panels shipped loose, this must be clearly noted.
3. Dampers with multiple panels in both width and height require structural support (by others). It is recommended that large openings be divided with structural members such that dampers will span either the width or height of each opening between the structural members with a single panel.
4. The AC1/AC2 is designed to operate in a clean, dry environment. For proper operation, dampers must be installed square, plumb, and without racking.

DAMPER SIZES

Panels	Minimum Panel	Maximum Panel
AC1 Parallel Blade	6"W x 6"H	48"W x 72"H
AC2 Opposed Blade	6"W x 11"H	48"W x 72"H



Flat 16-GA Head and Sill on
All Dampers Under 14"H.



AC1
Parallel Blade

air balance

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MODEL AC1/AC2

Single Thickness Blade • 200°F Max. Temperature • Parallel or Opposed • Steel Control Damper

Operations Rating:

Maximum Differential Pressure: 4 in.wg (1000 Pa)

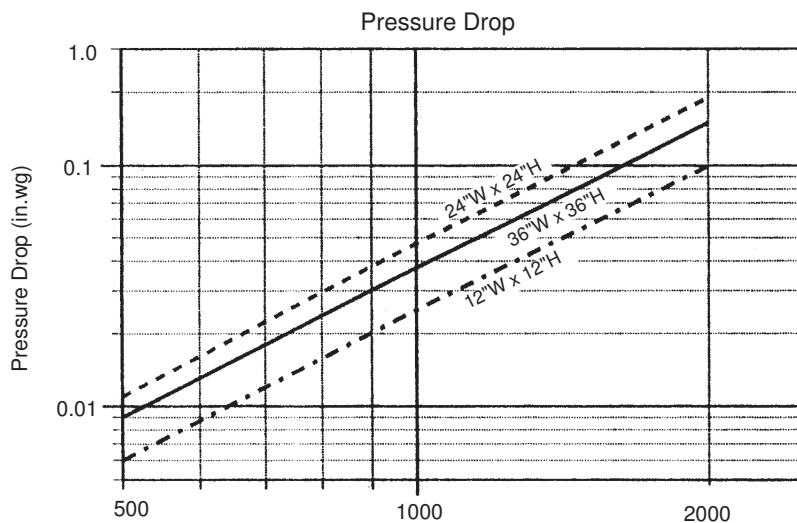
Maximum Face Velocity: 2000 fpm (10 m/s)

Leakage:

Leakage for AC1/AC2 with optional seals (vinyl on blade edges and stainless steel on jamb) shall not exceed 4.0 CFM per sq.ft. at 1 in.wg differential pressure and a temperature of 70°F with a minimum of .85" lbs. of torque applied to the damper shaft. Data based on a 48"W x 48"H sample tested in accordance with AMCA standard 500, figure 5.4 or 5.5.

Values shown in the note above are derived from tests performed in accordance with AMCA Standard 500 and are stated in SCFM at 1 in.wg. For leakage values at greater pressures, use the conversion factors in the table below.

Pressure in.wg	Conversion Factor
2	1.41
3	1.75
4	2.00



Typical Performance Curves
Tested per AMCA Standard 500-D; Figure 5.3 (In-Duct Mount)
(Smaller sizes will have higher pressure drops)

MODEL AC530

10" Deep • Single Thickness Blade • Round Steel Control Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 10" x 20-GA galvanized steel for dampers $\leq 18"$ dia.;
Dampers $\geq 20"$ 18-GA

BLADE: Double thickness galvanized steel, 14-GA equivalent

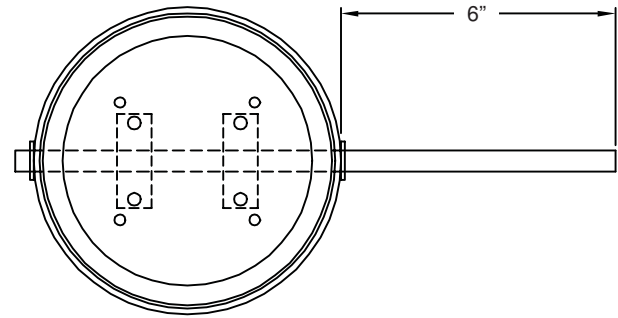
BEARINGS: Oil impregnated bronze sleeve

AXLES: $\frac{1}{2}"$ dia. galvanized or plated steel

SEALS: Neoprene, one piece, enclosed in a two piece blade construction

STOPS: #10-16 bolt with locknut at open and closed

ACTUATOR: An extended shaft 6" beyond the frame



OPTIONS

Actuator - Manual Quadrant, Electric, or Pneumatic (shipped loose)

2" Standoff for Manual Quadrant

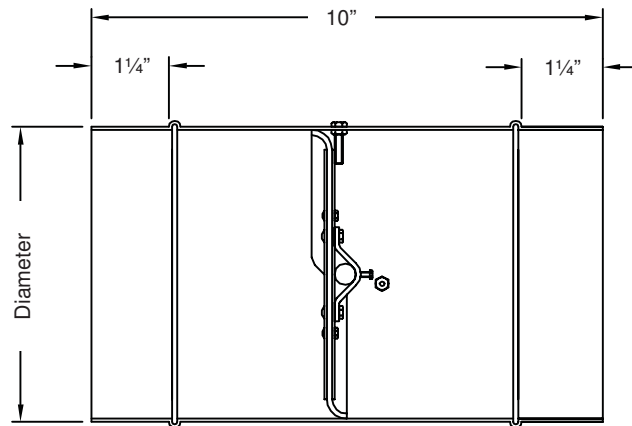
Motor Mount

NOTES

1. "A" diameter is opening dimension. Dampers are provided $\frac{1}{8}"$ undercut.

DAMPER SIZES

Panels	Sizes
AC530	4", 5",
	6", 7",
	8", 9",
	10",
	12",
	14",
	16",
	18",
	20",
	22",
	24" dia.



air balance

Dampers  Louvers
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MODEL AC530

10" Deep • Single Thickness Blade • Round Steel Control Damper

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MODEL 515/516

5½" Deep • Airfoil Blade • 150°F Max Temperature • Parallel or Opposed • Steel Control Damper

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 5½" x 7⁄8" x 16-GA galvanized steel hat channel**BLADE:** Airfoil shaped, double skin galvanized steel construction, 6-9/16" wide**SEALS:** Silicone on blade edges, and stainless steel at jambs**BEARINGS:** Heavy duty molded nylon**STOPS:** Galvanized steel angle at head and sill**IN-JAMB LINKAGE:** Plated steel tie bar and crank plates, and stainless steel pivots**FINISH:** Mill**ACTUATOR:** 6" extended shaft**OPTIONS**

Exact Size

Face/Bypass - Vertical, Horizontal, or Perpendicular

Sleeve - Transition - Sideplate

Vertical Blades

Flange - Front, Rear, or Both

Blade Seal - Vinyl

Jamb Seal - Stainless Steel

Jackshafting

Actuators - Manual Quadrants, 120V, 24V, 230V or Pneumatic

Position Indication Switch - PK1200, Small Aux Switch, or Integral to Actuator

Transformers

Explosion Proof Housing

Pilot Positioner

Copper Tubbing

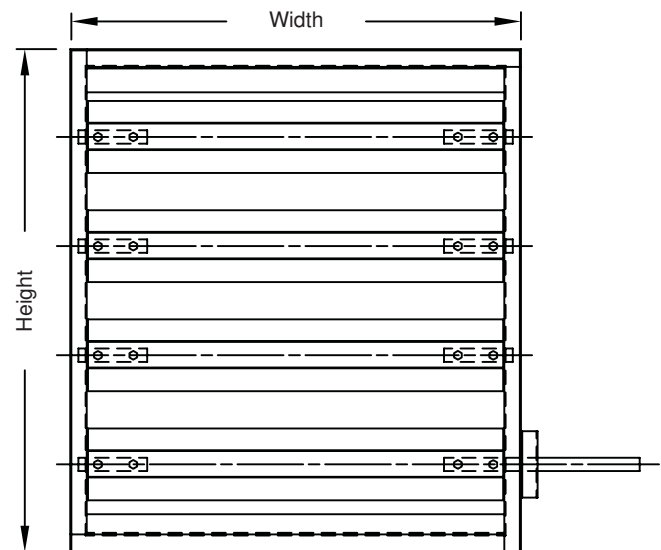
Tab-Lock Retaining Angles - 1 or 2 Sets

Bearings - OIB or Stainless Steel

Axle - Stainless Steel

Security Bars

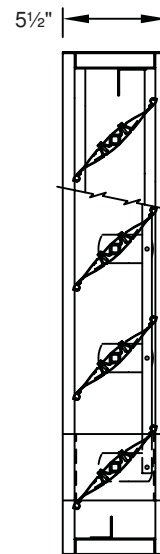
Finishes - Baked Enamel, Baked Epoxy, or Prime Coat

**NOTES**

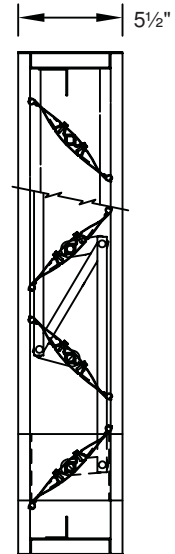
1. "A" width and "B" height are opening dimensions. Dampers are provided ¼" undercut.
2. Depending upon damper height, a variable width blade may be required, which will extend to a maximum of 3¼" from either the front or back of the damper. If the exact dimensions of this variable blade is critical contact the factory.
3. Dampers more than one panel wide operated with one actuator must be jackshafted.
4. Dampers may be installed vertically or horizontally, but we do not recommend installation with the blades in the vertical position.

DAMPER SIZES

Panels	Min Panel	Max Single Panel
515 Parallel Blade	8"W x 7"H	48"W x 72"H
516 Opposed Blade	8"W x 14"H	48"W x 72"H



515
Parallel View



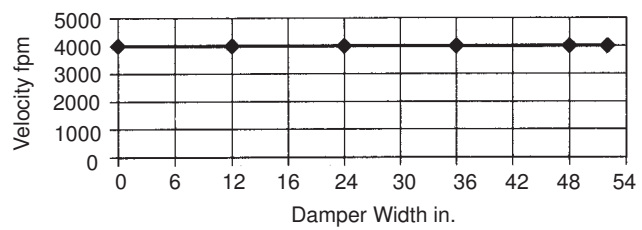
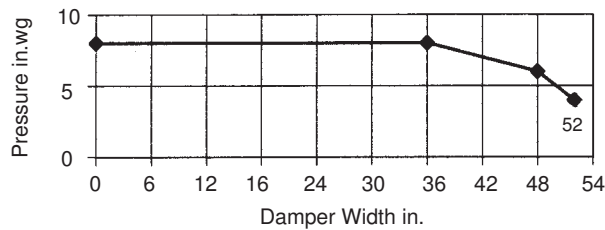
516
Opposed View

MODEL 515/516

5½" Deep • Airfoil Blade • 150°F Max Temperature • Parallel or Opposed • Steel Control Damper

Pressure Limitations:

The pressure limitations shown below are based on the design limits of the axles or blade deflection. Another model should be selected if pressure exceeds the values shown.

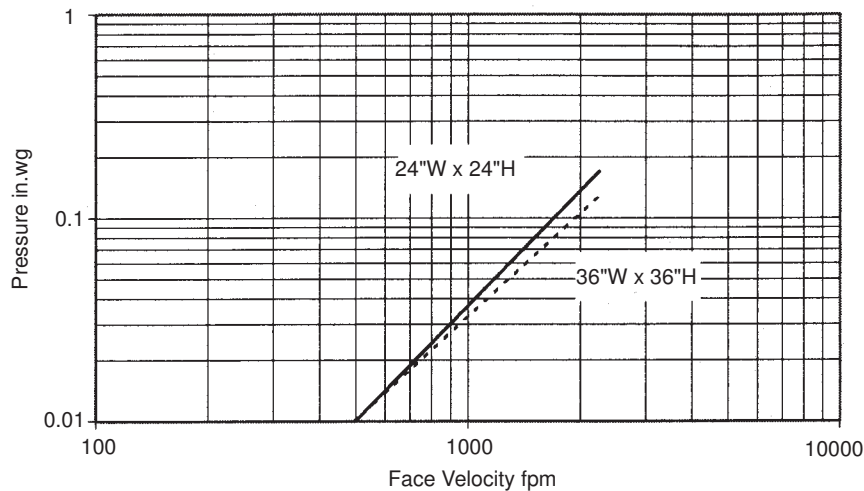
**Torque:**

Differential Pressure	in. lbs./sq.ft. required
2 in.wg	5
4 in.wg	10
6 in.wg	15

Pressure Drops: Typical Performance Curve

Tested per AMCA Standard 500; Figure 5.3. Size tested: 24"W x 24"H and 36"W x 36"H.

Note: Curves are for the two sizes indicated. Pressure drops will be somewhat lower for larger sizes and somewhat higher for smaller sizes.

**Leakage:**

Leakage for the AC515/516 shall not exceed 4.0 CFM per sq.ft. at 1 in.wg differential pressure and a temperature of 70°F with a minimum of .85" pounds of torque applied to the damper shaft. Data based on a 48" square sample tested in accordance with AMCA Standard 500 Figure 5.4 or 5.5.

Values shown in the note above are derived from tests performed in accordance with AMCA Standard 500 and are stated in SCFM at 1 in.wg. For leakage values at greater pressures use the conversion factors in the table below.

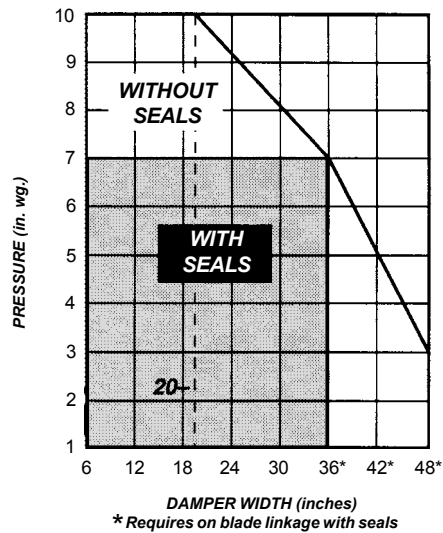
Pressure	Conversion Factor
2 in.wg	1.41
3 in.wg	1.73
4 in.wg	2.00



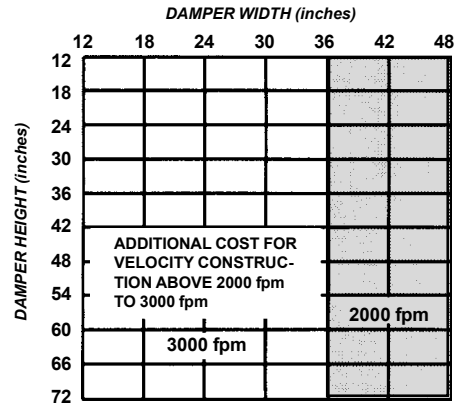
abi air balance
AMCA MEMBER A Mestek Company

7435 Industrial Rd. • Florence, KY 41042
Phone: 419-865-5000 • Fax: 419-865-1374
www.air-balance.com

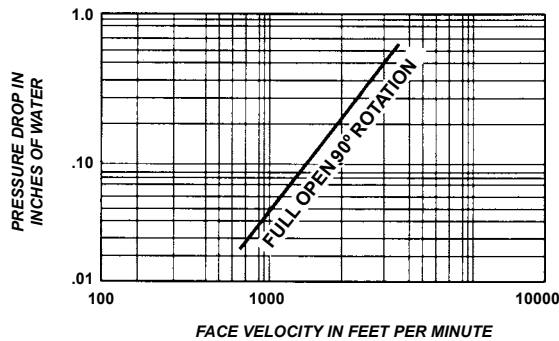
PRESSURE LIMITATIONS: The pressure ratings shown below are based on the design limits of the extended shaft or blade deflection. Another model should be selected if pressure exceeds the values shown.



VELOCITY LIMITATIONS: The velocity restrictions shown below are based on the design limits of the extended shaft. In-duct actuators, jackshafting, or another model is required if velocities exceed the values shown.



PRESSURE DROP: TYPICAL PERFORMANCE CURVE



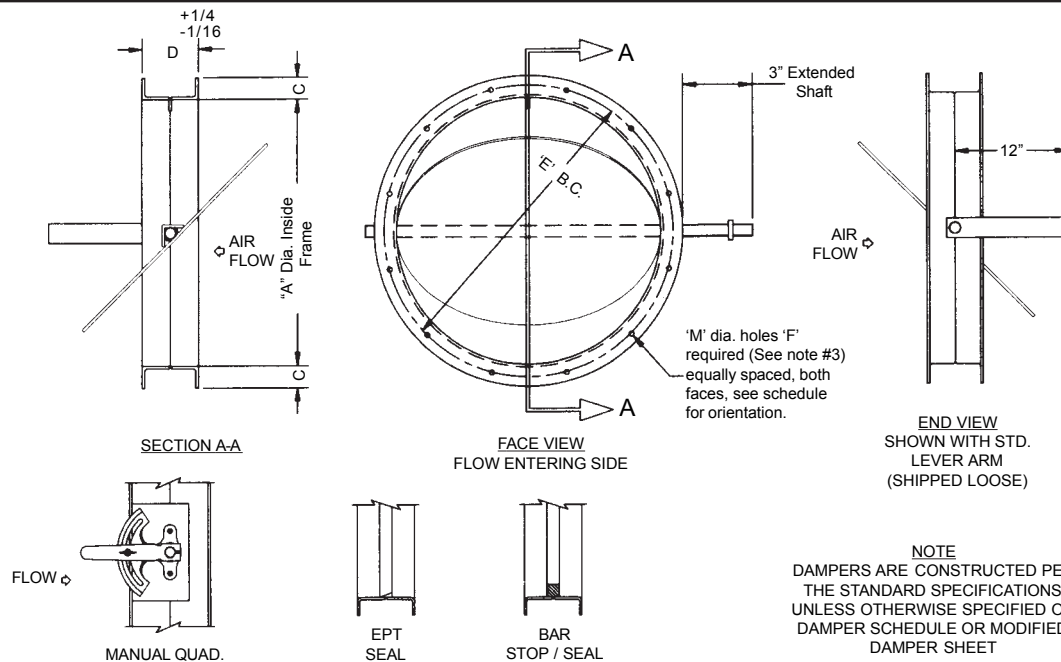
TESTED PER AMCA
STANDARD 500; FIGURE 5.3:
SIZE TESTED - 42" x 42"

LEAKAGE: Quantities are derived from tests performed in accordance with AMCA Standard 500. The values shown in the leakage chart are stated in SCFM at 1 in. wg. Use of the conversion factors will give leakage values at greater pressures.

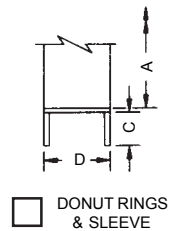
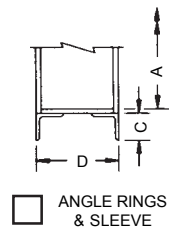
PRESSURE (in. wg.)	CONVERSION FACTOR
2	1.41
3	1.73
4	2.00
5	2.24
6	2.45
7	2.65

DAMPER HEIGHT (INCHES)	AC-411 WITHOUT SEALS								AC-411 WITH SEALS							
	DAMPER WIDTH (INCHES)								DAMPER WIDTH (INCHES)							
	12	18	24	30	36	42	48		12	18	24	30	36*	42*	48*	
12	103	116	128	141	153	166	178	9	10	11	12	14	15	16		
18	150	167	183	200	217	233	250	11	13	14	16	17	19	20		
24	182	198	215	232	248	265	282	12	14	15	17	18	20	21		
30	223	244	265	286	306	327	348	14	16	18	20	22	24	25		
36	259	284	309	334	359	384	409	17	19	21	23	25	27	30		
42	312	337	362	387	412	437	462	18	20	22	25	27	29	31		
48	359	388	417	446	476	505	534	20	23	25	28	30	33	35		
54	411	444	477	511	544	578	611	23	26	29	32	34	37	40		
60	411	444	477	511	544	578	611	23	26	29	32	34	37	40		
66	457	495	533	570	608	645	683	25	29	32	35	38	41	44		
72	509	551	593	635	676	718	760	28	32	35	39	42	46	49		

* Requires on-blade linkage with seals.



OPTIONAL FRAME STYLES



ABI Item No.	Quantity	"A" Inside Frame Diameter	"D" Frame Depth	Sleeve GA./Thk.	Blade GA./Thk.	Manual Quad	EPT Seal	Bar Stop / Seal	"E" Diameter Bolt Circle	"F" Holes Required	"M" Dia Holes	Straddle Vert. Centerline	On Vertical Centerline	REMARKS

Special Actuator:

Special Finish:

AC-561 STANDARD SPECIFICATIONS

- FRAME:** FRAME DEPTHS AND FLANGE WIDTHS VARY, MIN. 11 GAUGE STEEL BUTT WELDED ANGLES. (SEE DRAWINGS #AC-56-7 FOR STANDARD ANGLE SIZES AND FRAME DEPTHS)
- SLEEVE:** 16 GAUGE STEEL. (USED WITH OPTIONAL FRAME)
- BLADE:** 14 GAUGE STEEL, WELDED TO AXLE
- AXLE:** 1/2" DIAMETER STEEL FULL LENGTH
- BEARINGS:** OIL IMPREGNATED BRONZE WITH STAINLESS STEEL THRUST WASHERS
- STOPS:** 1/2" DIAMETER STEEL PIN
- SEALS:** (OPTIONAL, SEE SCHEDULE)
- FINISH:** ONE (1) COAT ABI STANDARD PRIMER.
- ACTUATOR:** EXTENDED SHAFT WITH LEVER ARM (SHIPPED LOOSE) IS STANDARD. (SEE SCHEDULE FOR OPTIONS)

NOTES

1. MAX. TEMP. = 250°F WITHOUT SEALS AND 150°F WITH SEALS.
2. DAMPERS ARE FOR CLEAN AIR USE ONLY.
3. REFERENCE DWG. #AC-56-7 FOR STANDARD MOUNTING HOLE PATTERNS.

PROJECT: _____

LOCATION: _____

ARCHITECT: _____

ENGINEER: _____

CONTRACTOR: _____

PO NUMBER: _____

DATE: _____

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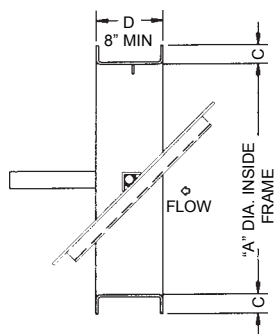
TORQUE:

The torque required to operate a control damper is the greatest torque value that the damper will see in operation. The tables below give torque values for various face velocities, differential pressures, and sealing requirements. The torque required for a damper with out seals is the torque due to velocity. The torque required for a damper with seals is the torque due to velocity, differential pressure or sealing the damper, whichever is greater.

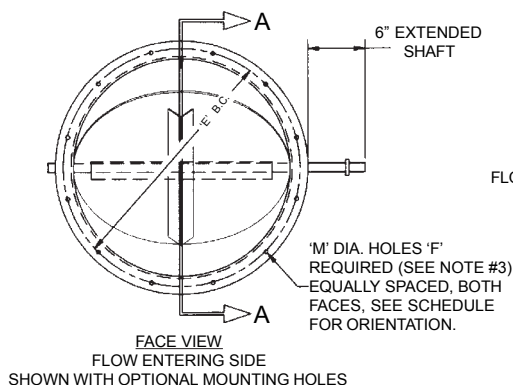
TORQUE:			
FACE VELOCITY TORQUE		DIFFERENTIAL PRESSURE TORQUE WITH BAR SEALS ONLY	EPT SEALING TORQUE ONLY
DIAMETER	IN. LBS.	IN. LBS.	IN. LBS.
3-1/16	10	N/A	10
4-1/16	10	N/A	10
5-1/16	10	N/A	10
6-3/32	10	N/A	10
7-1/8	10	10	10
8-1/8	10	10	10
9-1/8	10	10	10
10-1/8	11	10	10
11-1/8	15	10	10
These values are based on 3900 fpm face velocity. Use multiplier chart below for other face velocities.		These values are based on 5 in. wg. Use multiplier chart below for other differential pressures.	
FACE VELOCITY FPM	MULTIPLIER	DIFFERENTIAL PRESSURE IN. WG.	MULTIPLIER
3500	.805	4	.800
3000	.592	3	.600
2500	.411	2	.400
2000	.263	1	.200
1500	.148		
1000	.066		

LEAKAGE: Values expressed in SCFM			
DIAMETER	BAR SEALS	EPT SEALS	NO SEALS
3-1/16	N/A	4	55
4-1/16	N/A	5	73
5-1/16	N/A	5	90
6-3/32	N/A	6	110
7-1/8	24	6	129
8-1/8	28	7	145
9-1/8	31	7	165
10-1/8	33	8	183
11-1/8	36	8	200
Above values are based on 1 in. wg. differential pressure; for differential pressures other than 1 in. wg. (not exceeding 5 in. wg.), use the following multiplier chart below:			
DIFFERENTIAL PRESSURE IN. WG.		MULTIPLIER	
2		1.41	
3		1.73	
4		2.00	
5		2.23	

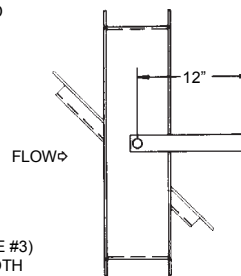
PRESSURE DROP: In inches of water		
Values are in accordance with AMCA 500; fig. 5.3		
DIAMETER	NO SEALS	BAR SEALS
3-1/16	.323	N/A
4-1/16	.222	N/A
5-1/16	.184	N/A
6-3/32	.168	N/A
7-1/8	.153	.279
8-1/8	.146	.222
9-1/8	.139	.203
10-1/8	.132	.193
11-1/8	.132	.176
Above values are based on 3900 fpm velocity. Use multiplier chart below for other velocities.		
FACE VELOCITY (FPM)	MULTIPLIER	
3500	.805	
3000	.592	
2500	.411	
2000	.263	
1500	.148	
1000	.066	



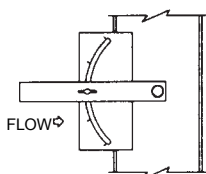
SECTION A-A



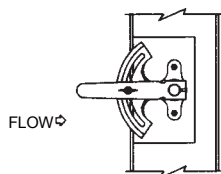
FACE VIEW
FLOW ENTERING SIDE
SHOWN WITH OPTIONAL MOUNTING HOLES



END VIEW
SHOWN WITH STD.
LEVER ARM
(SHIPPED LOOSE)



TYPE 1
MANUAL QUAD.



TYPE 2
MANUAL QUAD.
(FOR 1/2" DIA. AXLES ONLY)



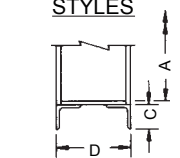
EPT
SEAL



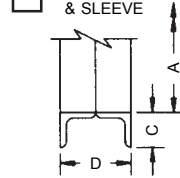
BAR
STOP / SEAL

NOTE
DAMPERS ARE CONSTRUCTED PER
THE STANDARD SPECIFICATIONS
UNLESS OTHERWISE SPECIFIED ON
DAMPER SCHEDULE OR MODIFIED
DAMPER SHEET

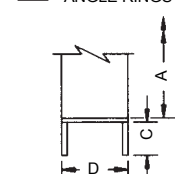
**OPTIONAL FRAME
STYLES**



ANGLE RINGS
& SLEEVE



BUTT WELDED
ANGLE RINGS



DONUT RINGS
& SLEEVE

ABI Item No.	Quantity	CONSTRUCTION OPTIONS										OPTIONAL MOUNTING HOLE DIMENSIONS			REMARKS
		"A" Inside Frame Diameter	"C" Flange Width Frame GA./Thk.	"D" Frame Depth Sleeve GA./Thk.	Flange GA./Thk.	Blade GA./Thk.	Axle Diameter	Manual Quad Type 1 or 2	EPT Seal	Bar Stop / Seal	"E"	"F"	"M"	1 Flange Air Entering Side <input type="checkbox"/>	
														1 Flange Air Leaving Side <input type="checkbox"/>	
														Both Flanges <input type="checkbox"/>	
														Straddle Vert. Centerline	
														On Vertical Centerline	

Special Actuator:

Special Finish:

AC-561 STANDARD SPECIFICATIONS

- FRAME:** 8" x 1-1/2" x 10 GA ROLLED STEEL CHANNEL THRU 25" DIAMETER.
10 x 2 x 10 GA ROLLED STEEL CHANNEL, 25" THRU 60" DIAMETER.
- SLEEVE:** (USED WITH OPTIONAL FRAMES)
14 GA. STEEL THRU 48" DIAMETER
12 GA. STEEL, 48" + THRU 60" DIAMETER
- BLADE:** 10 GA. STEEL, WELDED TO AXLE, THRU 48" DIAMETER
WITH STEEL REINFORCING ANGLES AS REQUIRED.
3/16" THK. STEEL, WELDED TO AXLE, 48" THRU 60" DIAMETER
WITH STEEL REINFORCING ANGLES AS REQUIRED.
- AXLE:** 1/2" DIAMETER STEEL FULL LENGTH THRU 24" DIAMETER
3/4" DIAMETER STEEL FULL LENGTH 24" + THRU 48" DIAMETER
1" DIAMETER STEEL FULL LENGTH 48" + THRU 60" DIAMETER
- BEARINGS:** OIL IMPREGNATED BRONZE WITH STAINLESS STEEL THRUST WASHERS
- STOPS:** 1/2" DIAMETER STEEL PIN
- SEALS:** (OPTIONAL, SEE SCHEDULE)
- FINISH:** ONE (1) COAT ABI STANDARD PRIMER.
- ACTUATOR:** EXTENDED SHAFT WITH LEVER ARM (SHIPPED LOOSE) IS STANDARD.
(SEE SCHEDULE FOR OPTIONS)

NOTES

- MAX. TEMP. = 250°F WITHOUT SEALS AND 150°F WITH SEALS.
- DAMPERS ARE FOR CLEAN AIR USE ONLY.
- REFERENCE DWG. #AC-56-6 FOR STANDARD MOUNTING HOLE PATTERNS.

PROJECT: _____
LOCATION: _____
ARCHITECT: _____
ENGINEER: _____
CONTRACTOR: _____
PO NUMBER: _____
DATE: _____

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AMCA MEMBER

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Phone: 419-865-5000 • Fax: 419-865-1374
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TORQUE:

The torque required to operate a control damper is the greatest torque value that the damper will see in operation. The tables below give torque values for various face velocities, differential pressures, and sealing requirements. The torque required for a damper without seals is the torque due to velocity. The torque required for a damper with seals is the torque due to velocity, differential pressure or sealing the damper, whichever is greater.

TORQUE:			
FACE VELOCITY TORQUE		DIFFERENTIAL PRESSURE TORQUE WITH BAR SEALS ONLY	EPT SEALING TORQUE ONLY
DIAMETER	IN. LBS.	IN. LBS.	IN. LBS.
12	20	8	12
18	65	15	25
24	160	30	45
30	310	45	70
36	535	63	100
42	850	85	135
48	1270	115	180
54	1805	145	225
60	2480	175	280
These values are based on 3900 fpm face velocity. Use multiplier chart below for other face velocities.		These values are based on 5 in. wg. Use multiplier chart below for other differential pressures.	
FACE VELOCITY FPM	MULTIPLIER	DIFFERENTIAL PRESSURE IN. WG.	MULTIPLIER
3500	.805	4	.800
3000	.592	3	.600
2500	.411	2	.400
2000	.263	1	.200
1500	.148		
1000	.066		

LEAKAGE: Values expressed in SCFM			
DIAMETER	BAR SEALS	EPT SEALS	NO SEALS
12	40	9	215
18	60	12	325
24	75	15	435
30	95	19	545
36	115	22	655
42	135	25	770
48	150	28	880
54	175	35	1640
60	195	40	1825
Above values are based on 1 in. wg. differential pressure; for differential pressures other than 1 in. wg. (not exceeding 5 in. wg.), use the following multiplier chart below:			
DIFFERENTIAL PRESSURE IN. WG.		MULTIPLIER	
2		1.41	
3		1.73	
4		2.00	
5		2.23	

PRESSURE DROP: In inches of water		
Values are in accordance with AMCA 500; fig. 5.3		
DIAMETER	NO SEALS	BAR SEALS
12	.132	.348
18	.114	.207
24	.108	.168
30	.114	.153
36	.108	.132
42	.108	.132
48	.114	.132
54	.108	.126
60	.108	.126
Above values are based on 3900 fpm velocity. Use multiplier chart below for other velocities.		
FACE VELOCITY (FPM)	MULTIPLIER	
3500	.805	
3000	.592	
2500	.411	
2000	.263	
1500	.148	
1000	.066	

MODEL ID30

4" Deep • Airfoil Blade • 250°F Max. Temperature • Industrial Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 16-GA galvanized steel; 4" deep; Hat-Shaped

BLADE: 16-GA galvanized steel airfoil; 8" wide max.

SHAFT: ½" dia. plated steel shaft full length

BEARINGS: Stainless steel flanged sleeve, press fit into frame

LINKAGE: Face mounted, located in the airstream; Formed bracket of ⅛" thick steel; Trunnion is a machined pivot of plated steel with a ⅝" dia. rod

OPERATOR: 6" extended shaft

FINISH: Mill

TEMP. LIMITS: 250°F; Consult factory for temperatures > 250°F

OPTIONS

Channel Frame

Frame Holes for Channel Frame

Flexible Stainless Steel Jamb or Blade Edge Seals

Neoprene Jamb or Blade Edge Seals

Stainless Steel Construction

Actuators - Electric or Pneumatic

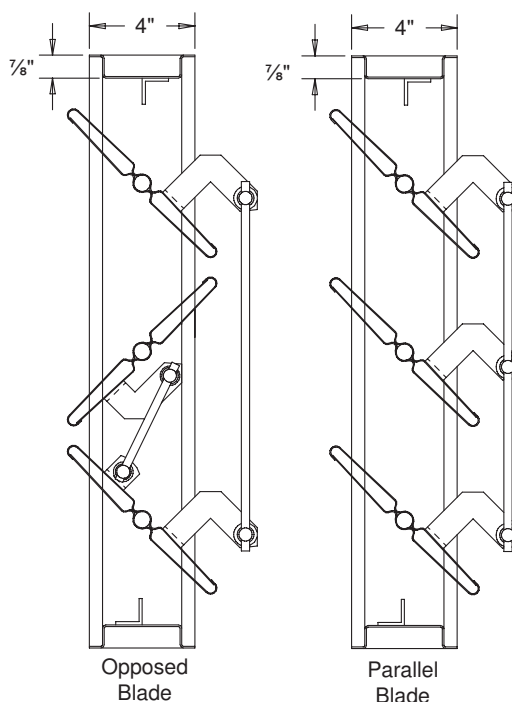
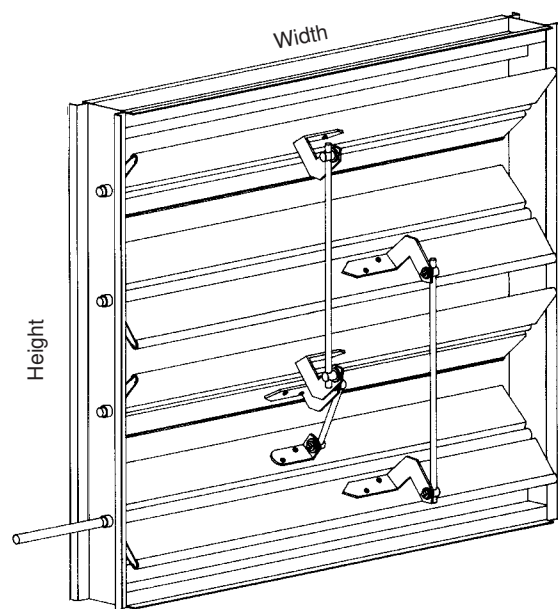
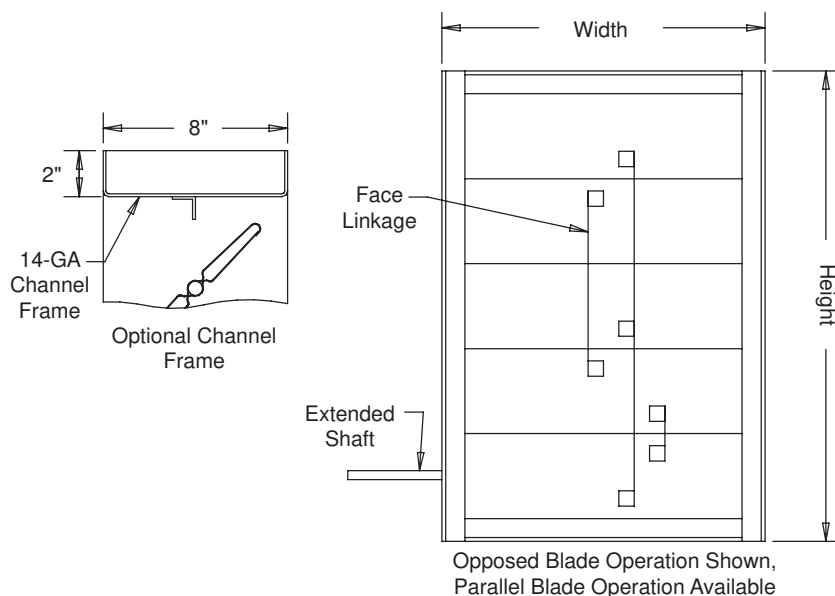
Finish - Baked Enamel, Kynar

NOTES

1. "A" width and "B" height are opening dimensions.
2. Hat-Shaped framed dampers are provided approximately ¼" undersize than the outside dimension.
3. Dampers with channel frames will be fabricated to exact inside dimension unless otherwise specified.

DAMPER SIZES

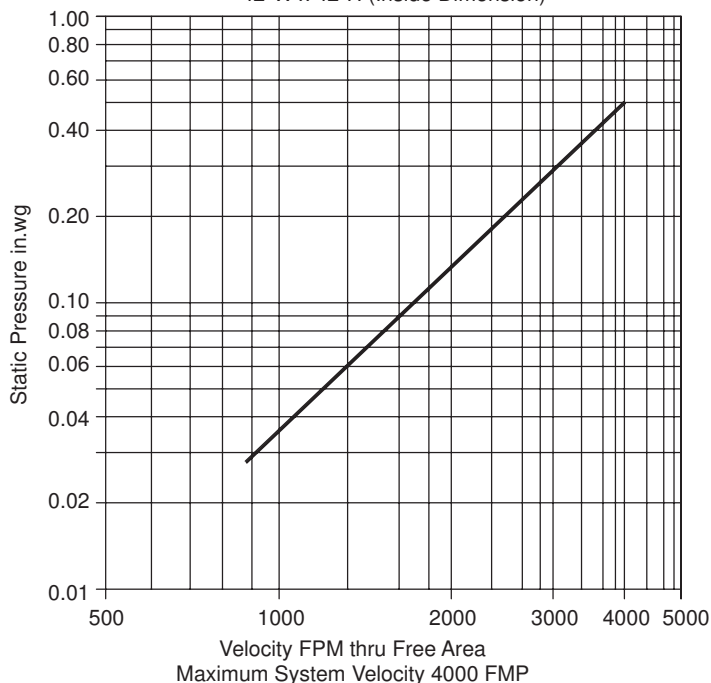
Panels	Min Panel	Max Single Panel
ID30	12"W x 8"H - Single Blade 12"W x 12"H - Opposed	48"W x 72"H - Hat-Shaped Frame 48"W x 96"H Channel Frame



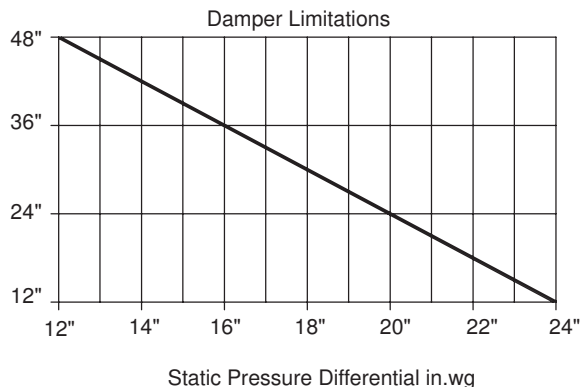
MODEL ID30

4" Deep • Airfoil Blade • 250°F Max. Temperature • Industrial Damper

Pressure Drop vs. Duct Velocity
42"W x 42"H (Inside Dimension)



To ensure proper damper operation and air leakage performance for this damper design. The static pressure/blade length limits shown provide the user with this information and in addition provides a relationship between damper cost and the application.



The ID30 design at a length of 48" has a maximum allowable blade deflection of L/360 for the static pressure indicated on the chart. At reduced blade lengths higher static pressure limits can be attained without sacrificing damper operating and performance characteristics.

Pressure drop curves listed are based on AMCA Standard 500. Using test set-up Fig. 5.3 for damper installed with duct upstream and downstream. Static Pressures are corrected to .075 lb/cu.ft. air density.

Air Leakage cfm

		Width (inside dimension)						
Height (inside dimension)		12	18	24	30	36	42	48
	12	5	4	8	10	12	14	16
	24	8	12	16	20	24	28	32
	36	12	18	24	30	36	42	48
	48	16	24	32	40	48	56	64
	60	20	30	40	50	60	70	80
	72	24	36	48	60	72	84	96
	84	28	42	56	70	84	98	112
	96	32	48	64	80	96	112	128

Shaded Area - Damper height can increase to 96" when furnished with channel frame.

Air leakage quantities shown in the chart are results of tests per AMCA Standard 500 and are shown at 1 in.wg differential pressure and corrected to .075 lb/cu.ft. air density.

For determining leakage values greater than 1 in.wg use the multiplier correction chart below.

Static Pressure (in)	2	3	4	5	6	7	8	9	10	11	12
Multiplier Correction Factor	1.5	2.0	2.5	2.8	3.1	3.4	3.8	4.4	5.0	5.6	6.3

Air leakage ratings are based on AMCA Standard 500 using test set up Fig 5.4 with a damper closing torque applied to the damper on 15 in.lbs/sq.ft of damper face area for a 48"W x 72"H, with a minimum of 25 in.lb/sq.ft of damper area for a size 48"W x 9½".

Damper air leakage show is based upon dampers furnished with blade and jamb seals. Results published are for the ABI model ID30 industrial damper for an entire range of damper sizes.

MODEL ID41

10" Deep • Single Thickness Blade • 250°F Max. Temperature • Industrial Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 2" x 10" x 2" - 12-GA galvanized steel formed channel frame, mechanically fastened together

BLADE: 12-GA galvanized press formed single thickness, welded to shaft; Blade width 6 $\frac{3}{4}$ " - 9 $\frac{3}{4}$ "

SHAFTS: $\frac{1}{2}$ " dia. corrosion resistant, plated cold finished steel stub; Drive blade to be continuous length

BEARINGS: Bronze oilite flanged sleeve pressed into frame

LINKAGE: Chevron type formed bracket of $\frac{1}{8}$ " thick steel. Trunnion is a machined pivot of plated steel with $\frac{5}{16}$ " dia. rod

FINISH: Mill

TEMP. LIMITS: 250°F

OPTIONS

Neoprene Blade Edge Seals

Stainless Steel Jamb Seals

Variable Flange Sizes

Perimeter Holes - One Flange or Both Flanges

External Linkage

Other Bearings

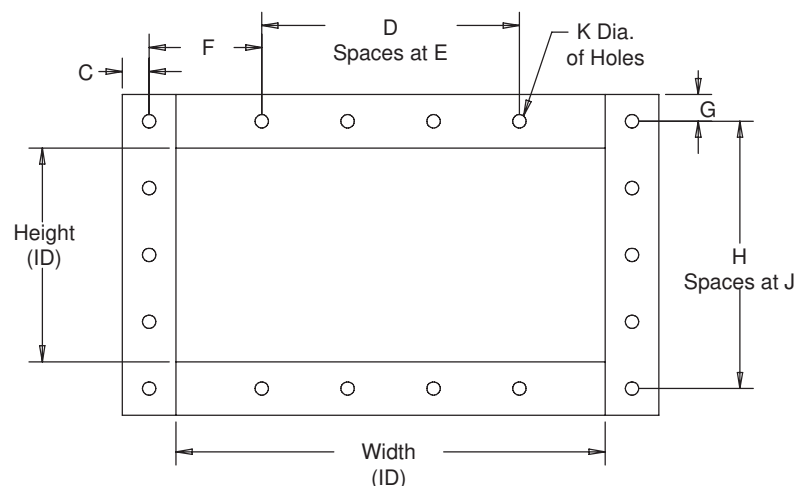
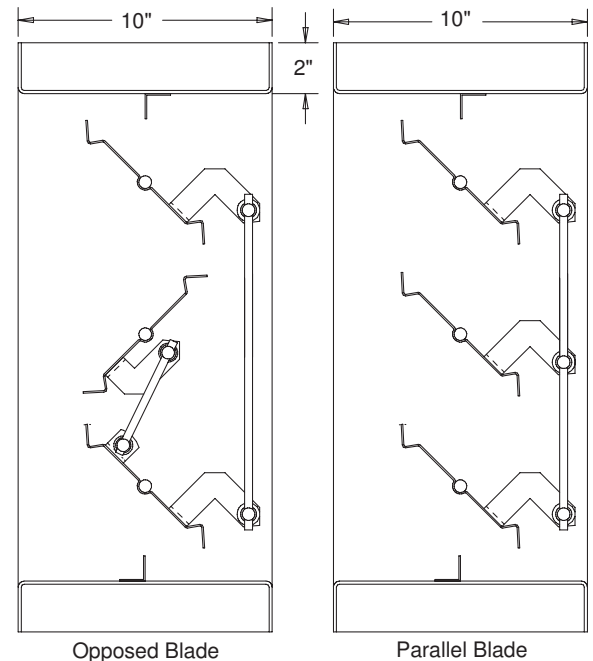
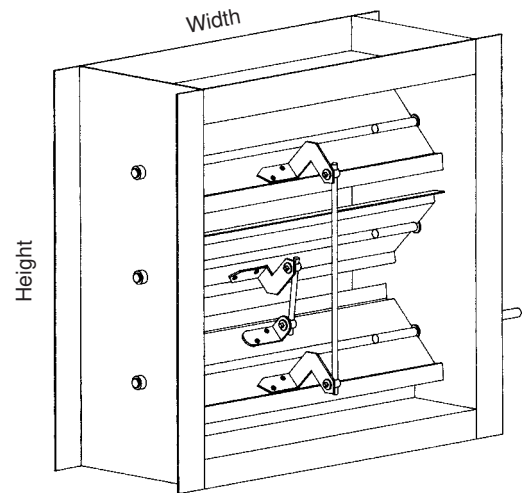
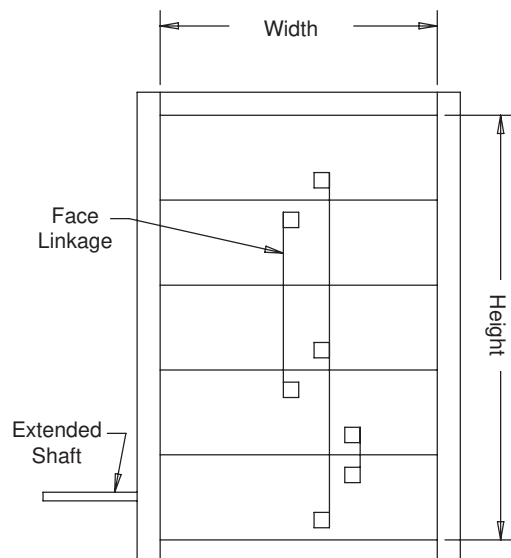
Other Materials

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided by inside dimension.
2. Velocities above 2500 fpm to 4000 fpm maximum shall require a double set of face linkage.

DAMPER SIZES

Panels	Min Panel (ID)	Max Single Panel (ID)
ID41	6"W x 6 $\frac{3}{4}$ "H Single Blade 6"W x 15"H Opposed Blades	48"W x 96"H without Seals 48"W x 72"H with Seals



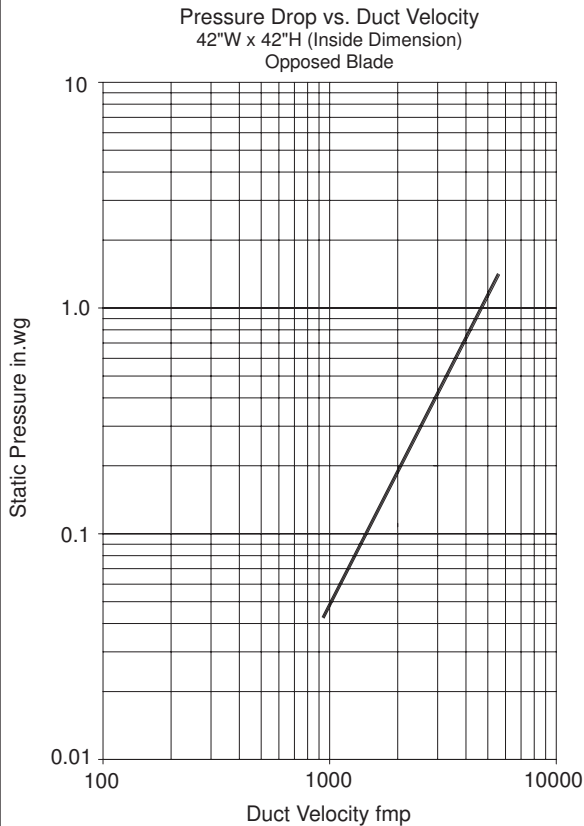
Optional Flange with Holes
(Must Specify Dimensions C-K)

MODEL ID41

10" Deep • Single Thickness Blade • 250°F Max. Temperature • Industrial Damper

Free Area:

Pressure drop curves listed are based on AMCA 500, using test set up Fig. 5.3 for damper installed with duct upstream and downstream. Static pressures are corrected to .075 lb/cu.ft. air density.



Air Leakage:

Air leakage quantities shown in the chart are results of tests per AMCA Standard 500 and are shown at 1 in.wg differential pressure and corrected to .075 lb/cu.ft. air density.

		Air Leakage cfm						
		Width						
Height		12	18	24	30	36	42	48
	12	7	10	13	17	20	23	27
	24	13	20	27	33	40	47	54
	36	20	30	40	50	60	70	80
	48	27	40	54	67	80	94	107
	60	33	50	67	84	100	117	134
	72	40	60	80	100	121	141	161

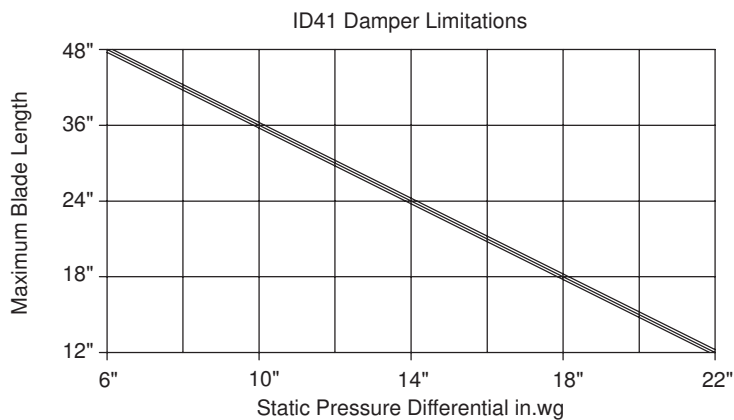
For determining leakage values greater than 1 in.wg to a maximum of 6 in.wg use the multiplier correction chart below

Static Pressure	2	3	4	5	6
Multiplier Correction Factor	1.4	1.7	2.1	2.5	2.8

Air leakage ratings are based on AMCA Standard 500 using test set up 5.4 with a damper closing torque applied to the damper of 20 in.lbs/sq.ft of damper area for a size 48"W x 72"H, with a minimum of 40 in.lbs/sq.ft. of damper area for a size 48"W x 6¾"H.

Damper air leakage shown is based upon publishing only the most conservative leakage results for the ABI model ID41 industrial damper for an entire range of damper sizes.

To ensure proper damper operation and air leakage performance for this damper design. The static pressure/blade length limits shown provide the user with this information and in addition provides a relationship between damper cost and the application.



The ID41 damper design at a blade length of 48" has a maximum allowable blade deflection of L/360 for the static pressure indication on the chart. At reduced blade lengths higher static pressure limits can be attained without sacrificing damper operating and performance characteristics.

MODEL ID42

10" Deep • Single Thickness Blade • 250°F Max. Temperature • Up to 8 in.wg Static Pressure at 2500 fpm • Industrial Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 2" x 10" x 2" - 12-GA galvanized steel formed channel frame, mechanically fastened together

BLADE: 12-GA galvanized press formed single thickness, welded to shaft; Blade width 6 $\frac{3}{4}$ " - 9 $\frac{3}{4}$ "

SHAFTS: $\frac{3}{4}$ " dia. corrosion resistant, plated cold finished steel stub; Drive blade to be continuous length

BEARINGS: Bronze oilite flanged sleeve pressed into frame

LINKAGE: Chevron type formed bracket of $\frac{1}{8}$ " thick steel; Trunnion is a machined pivot of plated steel with $\frac{5}{16}$ " dia. rod

FINISH: Mill

TEMP. LIMITS: 250°F

OPTIONS

Neoprene Blade Edge Seals

Stainless Steel Jamb Seals

Variable Flange Sizes

Perimeter Holes - One Flange or Both Flanges

External Linkage

Other Bearings

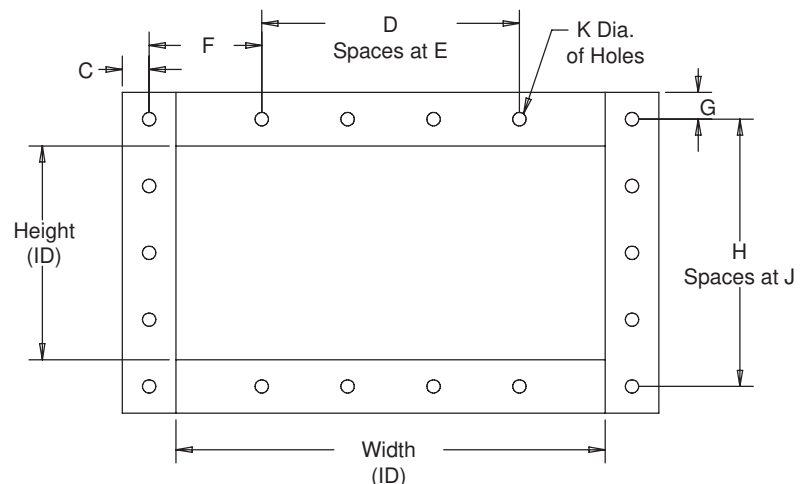
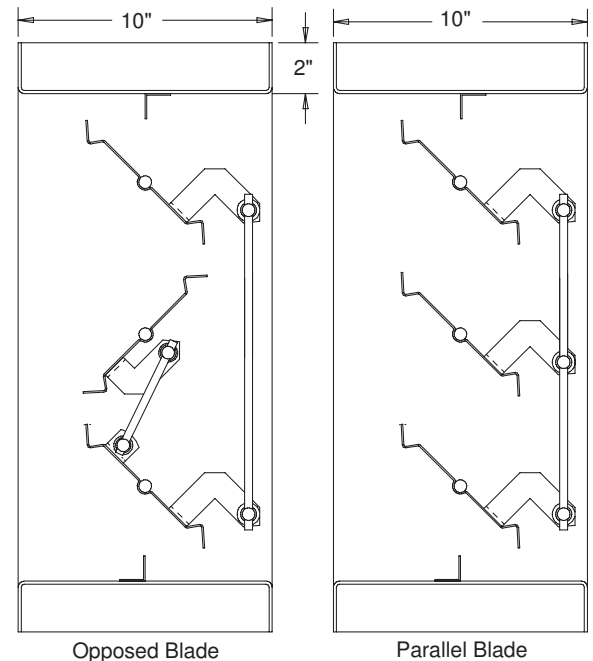
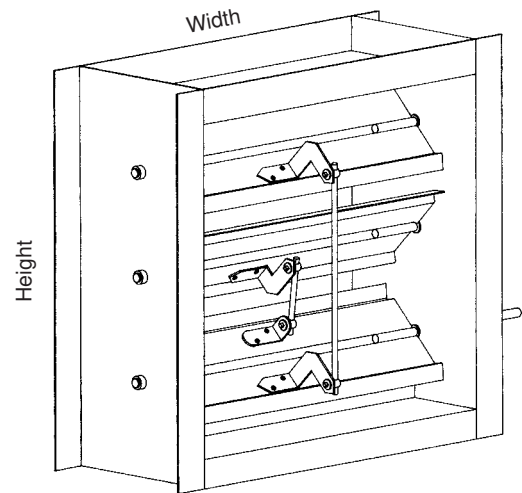
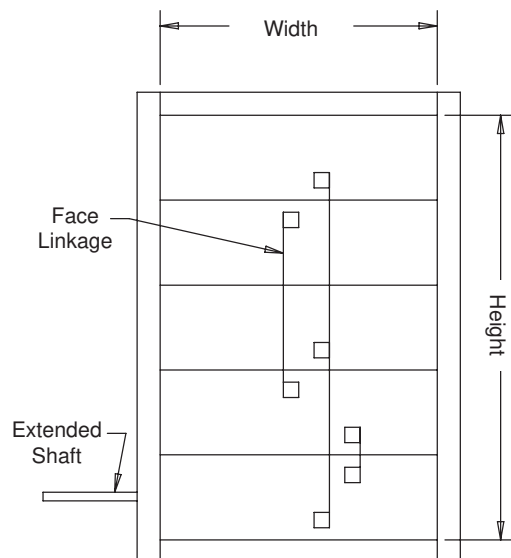
Other Materials

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided by inside dimension.
2. Velocities above 2500 fpm to 4000 fpm maximum shall require a double set of face linkage.

DAMPER SIZES

Panels	Min Panel (ID)	Max Single Panel (ID)
ID42	6"W x 6 $\frac{3}{4}$ "H Single Blade 6"W x 15"H Opposed Blades	48"W x 96"H without Seals 48"W x 72"H with Seals



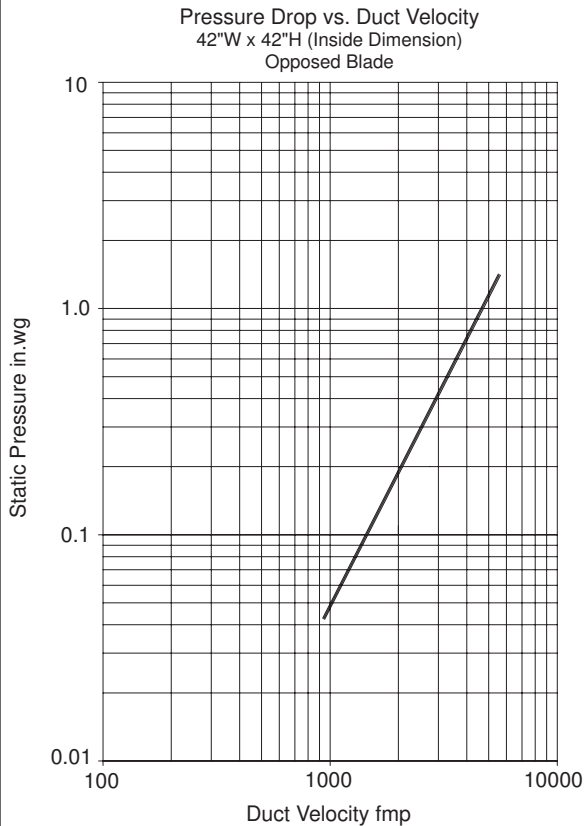
Optional Flange with Holes
(Must Specify Dimensions C-K)

MODEL ID42

10" Deep • Single Thickness Blade • 250°F Max. Temperature • Up to 8 in.wg Static Pressure at 2500 fpm • Industrial Damper

Free Area:

Pressure drop curves listed are based on AMCA 500, using test set up Fig. 5.3 for damper installed with duct upstream and downstream. Static pressures are corrected to .075 lb/cu.ft. air density.



Air Leakage:

Air leakage quantities shown in the chart are results of tests per AMCA Standard 500 and are shown at 1 in.wg differential pressure and corrected to .075 lb/cu.ft. air density.

		Air Leakage cfm						
		Width						
Height		12	18	24	30	36	42	48
	12	7	10	13	17	20	23	27
	24	13	20	27	33	40	47	54
	36	20	30	40	50	60	70	80
	48	27	40	54	67	80	94	107
	60	33	50	67	84	100	117	134
	72	40	60	80	100	121	141	161

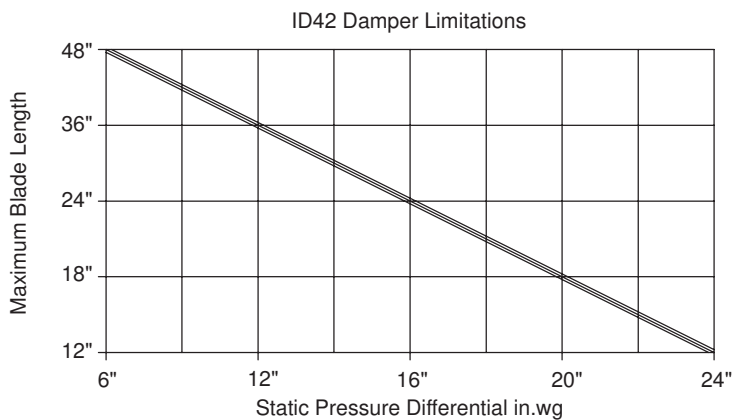
For determining leakage values greater than 1 in.wg to a maximum of 8 in.wg use the multiplier correction chart below

Static Pressure	2	3	4	5	6	7	8
Multiplier Correction Factor	1.4	1.7	2.1	2.5	2.8	3.2	3.6

Air leakage ratings are based on AMCA Standard 500 using test set up 5.4 with a damper closing torque applied to the damper of 25 in.lbs/sq.ft of damper area for a size 48"W x 72"H, with a minimum of 45 in.lbs/sq.ft. of damper area for a size 48"W x 6¾"H.

Damper air leakage shown is based upon publishing only the most conservative leakage results for the ABI model ID42 industrial damper for an entire range of damper sizes.

To ensure proper damper operation and air leakage performance for this damper design. The static pressure/blade length limits shown provide the user with this information and in addition provides a relationship between damper cost and the application.



The ID42 damper design at a blade length of 48" has a maximum allowable blade deflection of L/360 for the static pressure indication on the chart. At reduced blade lengths higher static pressure limits can be attained without sacrificing damper operating and performance characteristics.

MODEL ID43

10" Deep • Single Thickness Blade • 250°F Max. Temperature • Up to 10 in.wg Static Pressure at 2500 fmp • Industrial Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 2" x 10" x 2" - 12-GA galvanized steel formed channel frame, mechanically fastened together

BLADE: 12-GA galvanized press formed single thickness, welded to shaft; Blade width 6 $\frac{3}{4}$ " - 9 $\frac{3}{4}$ "

SHAFTS: $\frac{1}{2}$ " dia. corrosion resistant, plated cold finished steel stub; Drive blade to be continuous length

BEARINGS: Bronze oilite flanged sleeve pressed into frame

LINKAGE: Chevron type formed bracket of $\frac{1}{8}$ " thick steel; Trunnion is a machined pivot of plated steel with $\frac{5}{16}$ " dia. rod

FINISH: Mill

TEMP. LIMITS: 250°F

OPTIONS

Neoprene Blade Edge Seals

Stainless Steel Jamb Seals

Variable Flange Sizes

Perimeter Holes - One Flange or Both Flanges

External Linkage

Other Bearings

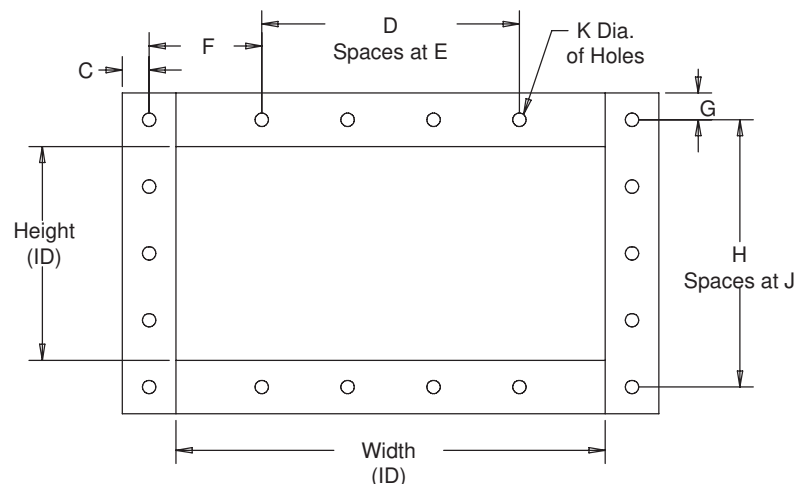
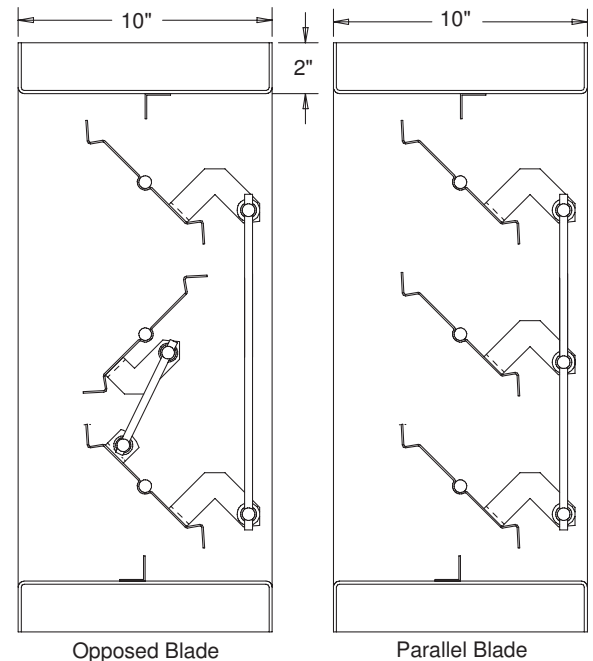
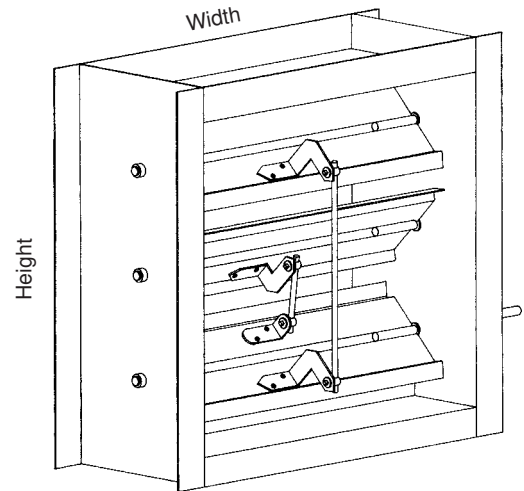
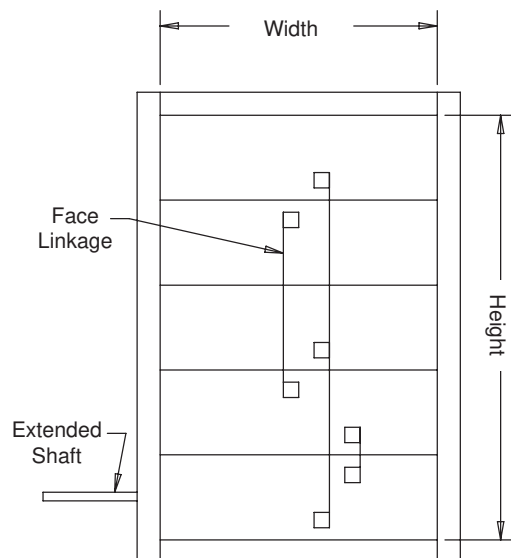
Other Materials

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided by inside dimension.
2. Velocities above 2500 fpm to 4000 fpm maximum shall require a double set of face linkage.

DAMPER SIZES

Panels	Min Panel (ID)	Max Single Panel (ID)
ID43	6"W x 6 $\frac{3}{4}$ "H Single Blade 6"W x 15"H Opposed Blades	48"W x 96"H without Seals 48"W x 72"H with Seals



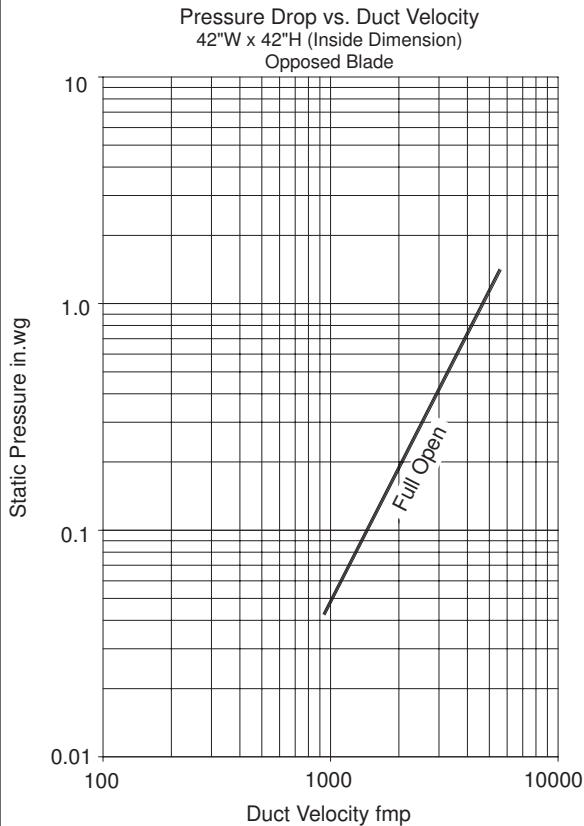
Optional Flange with Holes
(Must Specify Dimensions C-K)

MODEL ID43

10" Deep • Single Thickness Blade • 250°F Max. Temperature • Up to 10 in.wg Static Pressure at 2500 fmp • Industrial Damper

Free Area:

Pressure drop curves listed are based on AMCA 500, using test set up Fig. 5.3 for damper installed with duct upstream and downstream. Static pressures are corrected to .075 lb/cu.ft. air density.



Air Leakage:

Air leakage quantities shown in the chart are results of tests per AMCA Standard 500 and are shown at 1 in.wg differential pressure and corrected to .075 lb/cu.ft. air density.

		Air Leakage cfm						
		Width						
Height		12	18	24	30	36	42	48
	12	7	10	13	17	20	23	27
	24	13	20	27	33	40	47	54
	36	20	30	40	50	60	70	80
	48	27	40	54	67	80	94	107
	60	33	50	67	84	100	117	134
	72	40	60	80	100	121	141	161

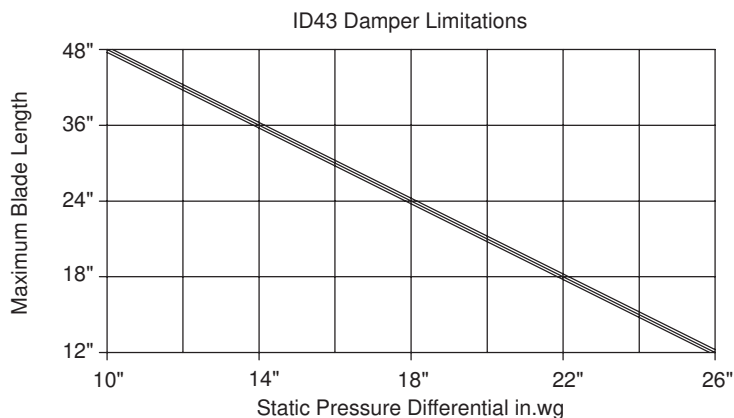
For determining leakage values greater than 1 in.wg to a maximum of 10 in.wg use the multiplier correction chart below

Static Pressure	2	3	4	5	6	7	8	9	10
Multiplier Correction Factor	1.4	1.7	2.1	2.5	2.8	3.2	3.6	4.1	4.5

Air leakage ratings are based on AMCA Standard 500 using test set up 5.4 with a damper closing torque applied to the damper of 30 in.lbs/sq.ft of damper area for a size 48"W x 72"H, with a minimum of 50 in.lbs/sq.ft. of damper area for a size 48"W x 6¾"H.

Damper air leakage shown is based upon publishing only the most conservative leakage results for the ABI model ID43 industrial damper for an entire range of damper sizes.

To ensure proper damper operation and air leakage performance for this damper design. The static pressure/blade length limits shown provide the user with this information and in addition provides a relationship between damper cost and the application.



The ID43 damper design at a blade length of 48" has a maximum allowable blade deflection of L/360 for the static pressure indication on the chart. At reduced blade lengths higher static pressure limits can be attained without sacrificing damper operating and performance characteristics.

MODEL ID50

10" Deep • Airfoil Blade • 450°F Max. Temperature • Up to 12 in.wg Static Pressure • Industrial Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 2" x 10" x 2" - 12-GA galvanized steel formed channel frame

BLADE: 16-GA airfoil to max. 48" length; 12-GA airfoil to max. 60" length

SHAFTS: 3/4" dia. corrosion resistant, plated cold finished steel

BEARINGS: Stainless steel angled sleeve, bolted to frame

LINKAGE: 1/2" dia. inter-connecting rod with trunnion pivot fastener; Located in jamb

OPERATOR: Manual hand quadrant or lever arm for electric or pneumatic actuator

FINISH: Mill

TEMP. LIMITS: 450°F

OPTIONS

Stainless Steel Blade Edge Seals or Jamb Seals

Stuffing Boxes and Replaceable Packing

Variable Flange Sizes

Finish - Baked Enamel, Kynar, Anodize

Perimeter Holes - One Flange or Both Flanges

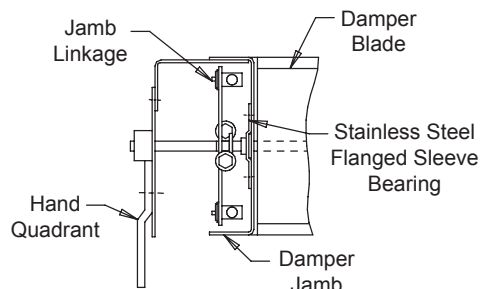
Other Material

NOTES

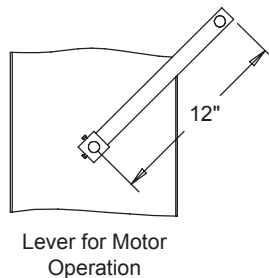
1. "A" width and "B" height are opening dimensions. Dampers are provided by inside dimension.

DAMPER SIZES

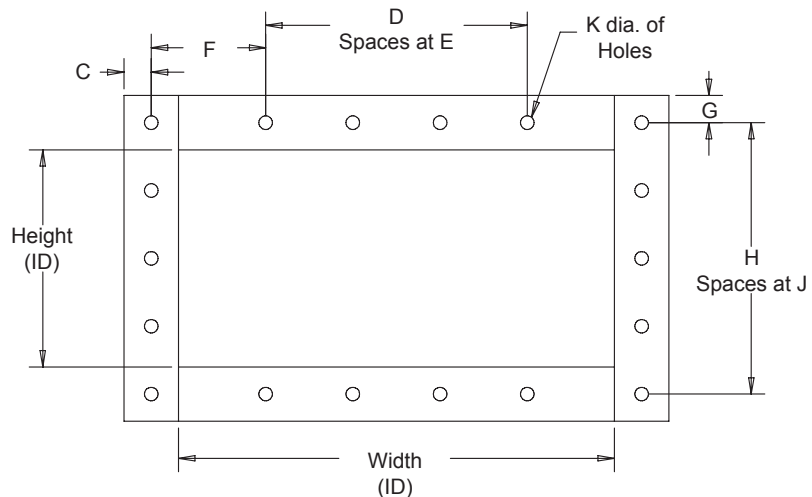
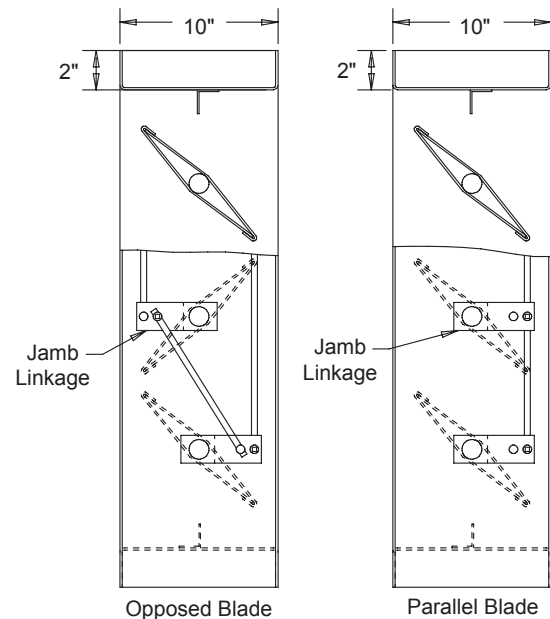
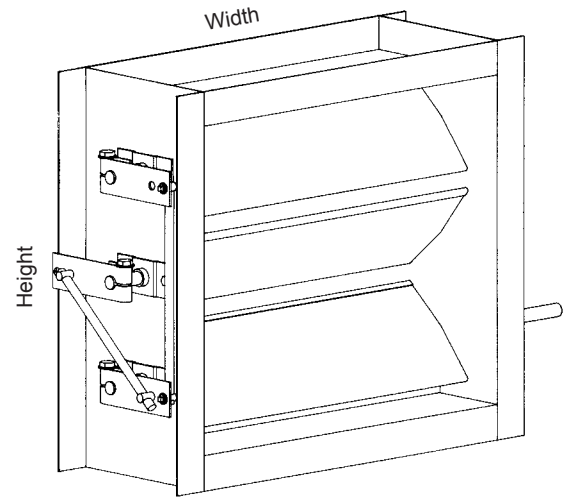
Panels	Min Panel (ID)	Max Single Panel (ID)
ID50	6"W x 6"H Single Blade 6"W x 12"H Opposed Blades	60"W x 96"H



Jamb Linkage Detail



Lever for Motor Operation



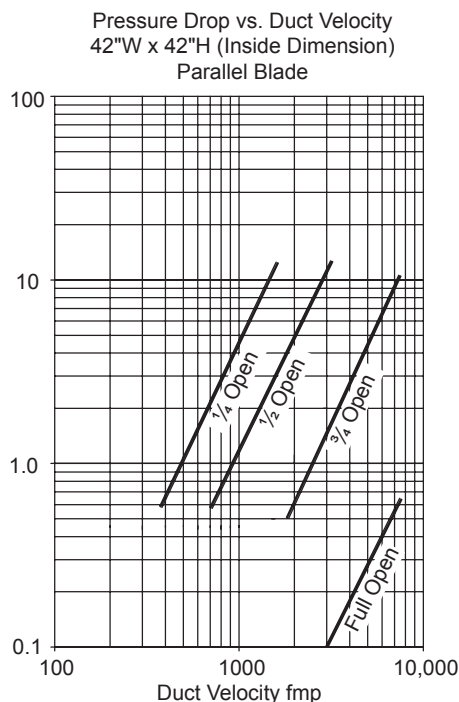
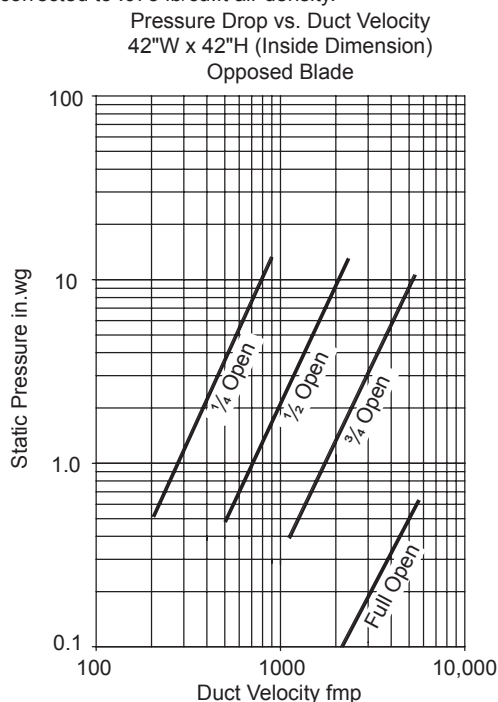
Optional Flange with Holes
(Must Specify Dimensions C-K)

MODEL ID50

10" Deep • Airfoil Blade • 450°F Max. Temperature • Up to 12 in.wg Static Pressure • Industrial Damper

Free Area:

Pressure drop curves listed are based on AMCA Standard 500, using test set up Fig. 5.3 for damper installed with duct upstream and downstream. Static pressures are corrected to .075 lb/cu.ft air density.



Air Leakage:

Air leakage quantities shown in the chart are results of tests per AMCA Standard 500 and are shown at 1 in.wg differential pressure and corrected to .075 lb/cu.ft. air density.

		Air Leakage cfm								
		Width								
Height		12	18	24	30	36	42	48	54	60
	12	6	8	11	14	17	19	22	25	28
	24	11	17	22	28	33	39	44	50	55
	36	17	25	33	41	50	58	66	74	83
	48	22	33	44	55	66	77	88	99	110
	60	28	41	55	69	83	96	110	124	138
	72	33	50	66	83	99	116	132	149	165
	84	39	58	77	96	116	135	154	173	193
	96	44	66	88	110	132	154	176	198	220

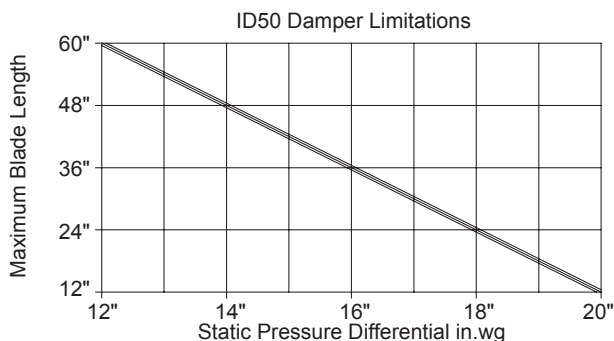
Air leakage ratings are based on AMCA Standard 500 using test set up 5.4 with a damper closing torque applied to the damper of 38 in.lb/sq.ft. of damper area for a size 60"W x 96"H, with a minimum of 45 in.lb/sq.ft. of damper area for a size 60"W x 8"H.

Damper air leakage shown is based upon publishing only the most conservative leakage results for the ABI Model ID50 Industrial Damper for an entire range of damper sizes.

To ensure proper damper operation and air leakage performance for this damper design. The static pressure/blade length limits shown provide the user with this information and in addition provides a relationship between damper cost and the application.

For determining leakage values greater than 1 in.wg to a maximum of 12 in.wg use the multiplier correction chart below.

Static Pressure	2	3	4	5	6	7	8	9	10	11	12
Multiplier Correction Factor	1.5	2.0	2.3	2.7	3.0	3.3	3.6	3.9	4.3	4.5	5.0



The ID50 damper design at a blade length of 6" has a maximum allowable blade deflection of L/360 for the static pressure indicated on the chart. At reduced blade lengths higher static pressure limits can be attained without sacrificing damper operating and performance characteristics.

In the interest of product development, Air Balance reserves the right to make changes without notice.

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MODEL ID51

10" Deep • Airfoil Blade • 450°F Max. Temperature • Up to 20 in.wg Static Pressure • Industrial Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 2" x 10" x 2" - 10-GA galvanized steel formed channel frame

BLADE: 12-GA airfoil for dampers < 48"W; 10-GA airfoil for dampers 48"W - 60"W

SHAFTS: ¾" dia. corrosion resistant, plated cold finished steel for dampers < 48"W; 1" dia. for dampers 48"W - 60"W

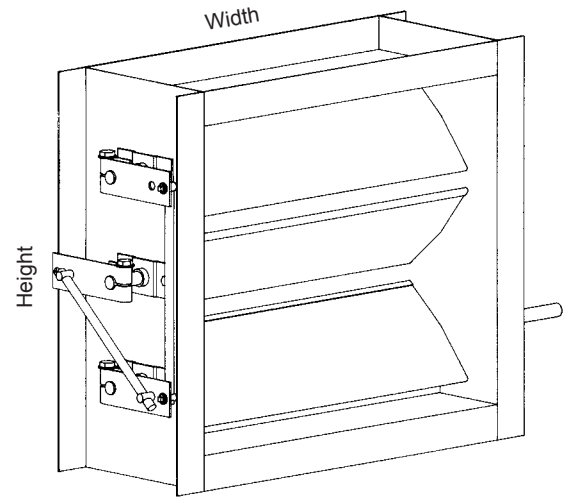
BEARINGS: Stainless steel angled sleeve, bolted to frame

LINKAGE: ½" dia. inter-connecting rod with trunnion pivot fastener; Located in jamb

OPERATOR: Manual hand quadrant or lever arm for electric or pneumatic actuator

FINISH: Mill

TEMP. LIMITS: 450°F; Consult factory for temp. > 450°F



OPTIONS

Stainless Steel Blade Edge Seals or Jamb Seals

Stuffing Boxes and Replaceable Packing

Variable Flange Sizes

Finish - Baked Enamel, Kynar, Anodize

Perimeter Holes - One Flange or Both Flanges

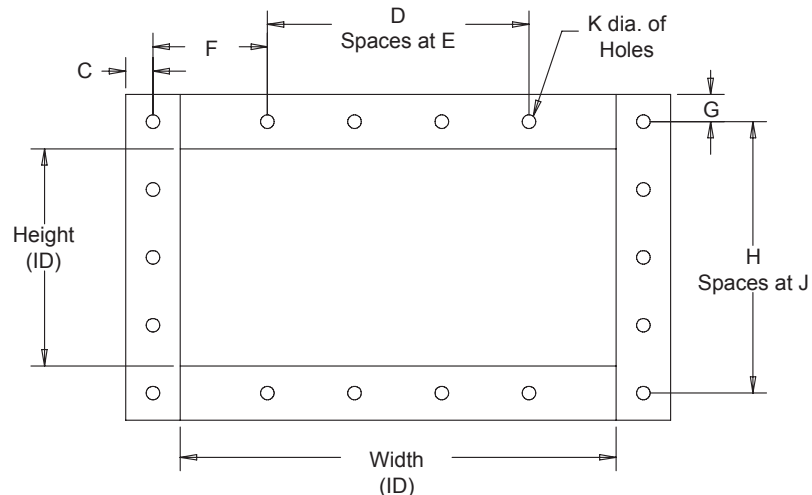
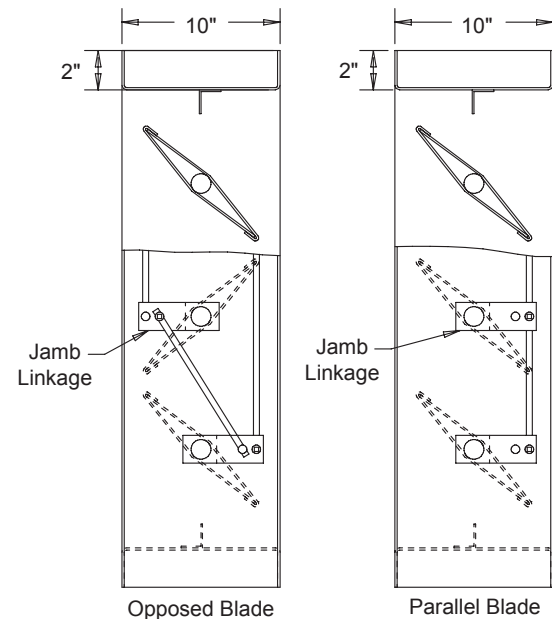
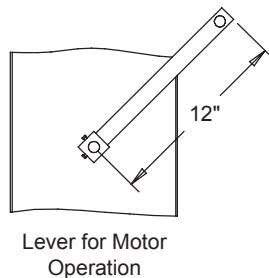
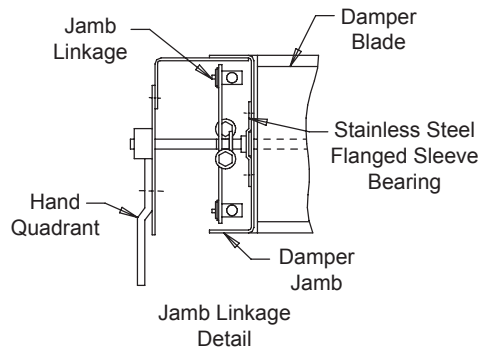
Other Material

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided by inside dimension.

DAMPER SIZES

Panels	Min Panel (ID)	Max Single Panel (ID)
ID51	6"W x 6"H Single Blade 6"W x 12"H Opposed Blades	60"W x 96"H



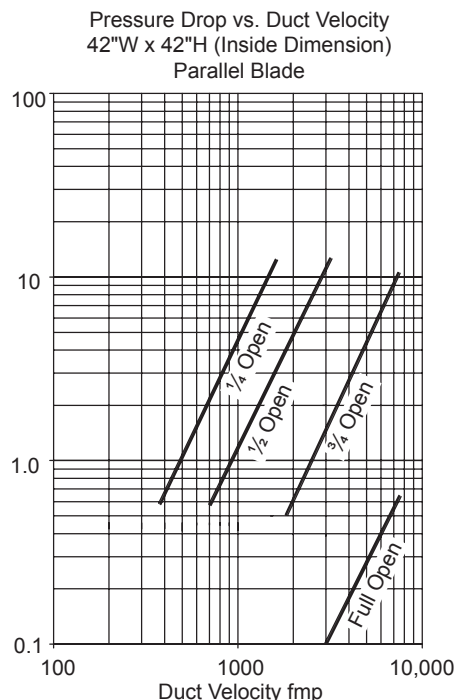
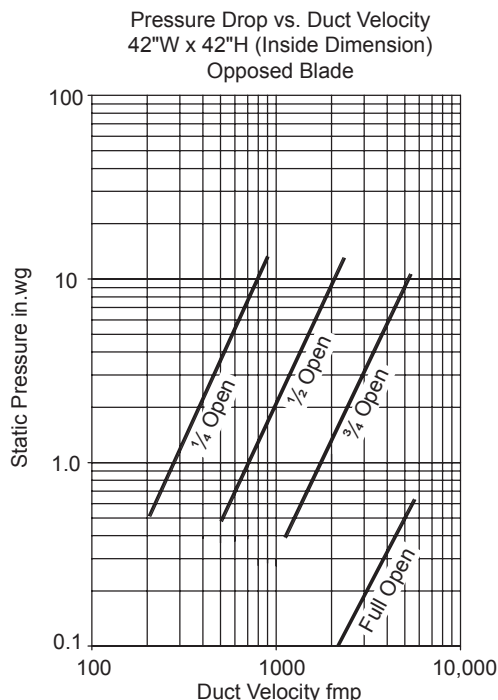
Optional Flange with Holes
(Must Specify Dimensions C-K)

MODEL ID51

10" Deep • Airfoil Blade • 450°F Max. Temperature • Up to 20 in.wg Static Pressure • Industrial Damper

Free Area:

Pressure drop curves listed are based on AMCA Standard 500, using test set up Fig. 5.3 for damper installed with duct upstream and downstream. Static pressures are corrected to .075 lb/cu.ft air density.



Air Leakage:

Air leakage quantities shown in the chart are results of tests per AMCA Standard 500 and are shown at 1 in.wg differential pressure and corrected to .075 lb/cu.ft. air density.

		Air Leakage cfm								
		Width								
Height		12	18	24	30	36	42	48	54	60
	12	5	7	10	12	14	17	19	22	24
	24	10	14	19	24	29	34	39	43	48
	36	14	22	29	36	43	51	58	65	72
	48	19	29	39	48	58	68	77	87	96
	60	24	36	48	60	72	84	96	108	121
	72	29	43	58	72	87	101	116	130	145
	84	32	51	68	84	101	118	135	152	169
	96	39	58	77	96	116	135	154	174	193

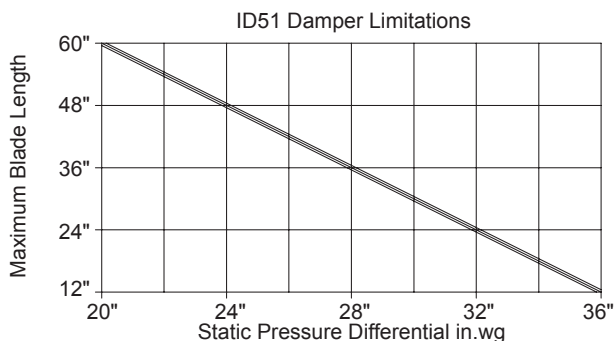
Air leakage ratings are based on AMCA Standard 500 using test set up 5.4 with a damper closing torque applied to the damper of 75 in.lb/sq.ft. of damper area for a size 60"W x 96"H, with a minimum of 55 in.lb/sq.ft. of damper area for a size 60"W x 8"H.

Damper air leakage shown is based upon publishing only the most conservative leakage results for the ABI Model ID51 Industrial Damper for an entire range of damper sizes.

To ensure proper damper operation and air leakage performance for this damper design. The static pressure/blade length limits shown provide the user with this information and in addition provides a relationship between damper cost and the application.

For determining leakage values greater than 1 in.wg to a maximum of 20 in.wg use the multiplier correction chart below.

Static Pressure	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Multiplier Correction Factor	1.3	1.6	1.9	2.2	2.4	2.6	2.8	3.0	3.2	3.3	3.5	3.6	3.7	3.9	4.0	4.1	4.2	4.4	4.5



The ID51 damper design at a blade length of 6" has a maximum allowable blade deflection of L/360 for the static pressure indicated on the chart. At reduced blade lengths higher static pressure limits can be attained without sacrificing damper operating and performance characteristics.

In the interest of product development, Air Balance reserves the right to make changes without notice.

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MODEL ID54

10" Deep • Airfoil Blade • 800°F Max. Temperature • Up to 15 in.wg Static Pressure • Industrial Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 2" x 10" x 2" - 10-GA hot roll formed channel frame

BLADE: 10-GA airfoil; Blade width 6" - 9¾"

SHAFTS: 1" dia. cold finished steel

BEARINGS: Ball bearings, mounted on stand-off bracket with stuffing box and replaceable packing

LINKAGE: ½" dia. inter-connecting rod with trunnion pivot fastener; Located in jamb

OPERATOR: Manual hand quadrant or lever arm for electric or pneumatic actuator

FINISH: Hi-temperature aluminum paint

TEMP. LIMITS: 800°F; Consult factory for temp. > 800°F

OPTIONS

Stainless Steel Blade Edge Seals or Jamb Seals

Variable Flange Sizes

Perimeter Holes - One Flange or Both Flanges

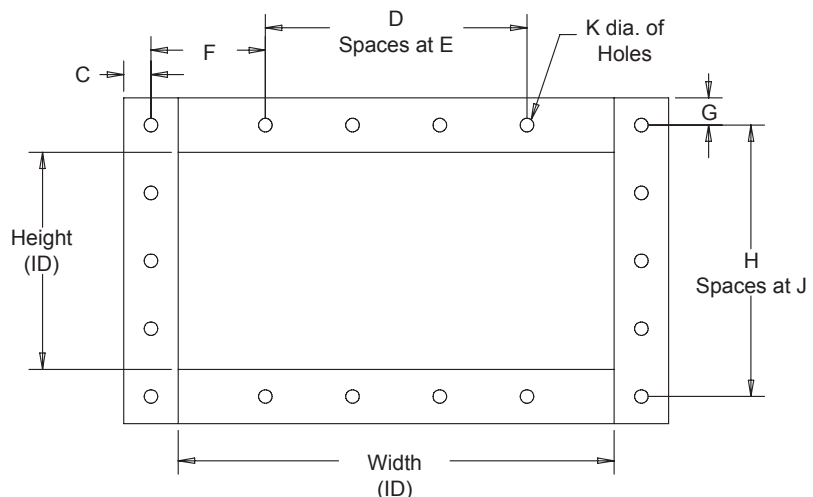
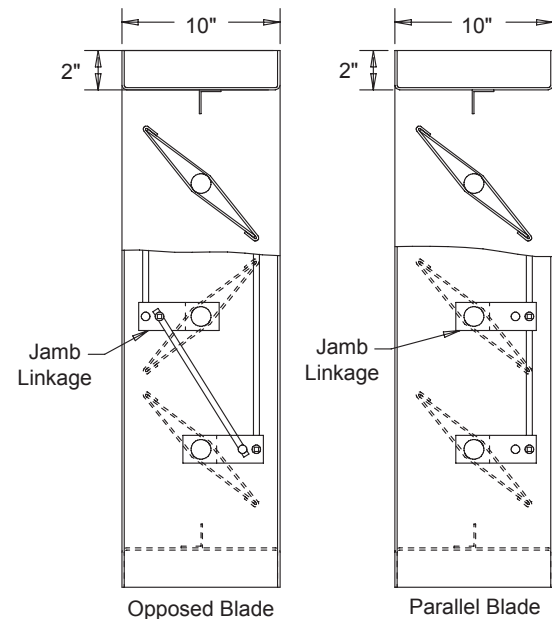
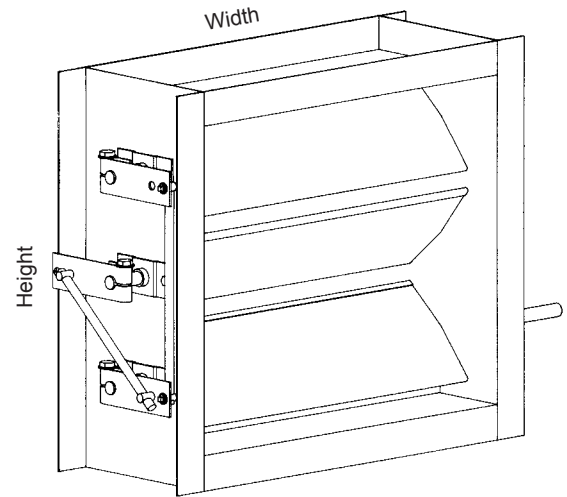
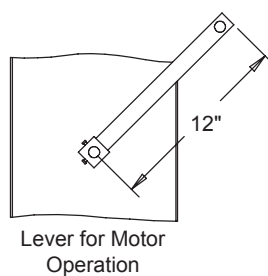
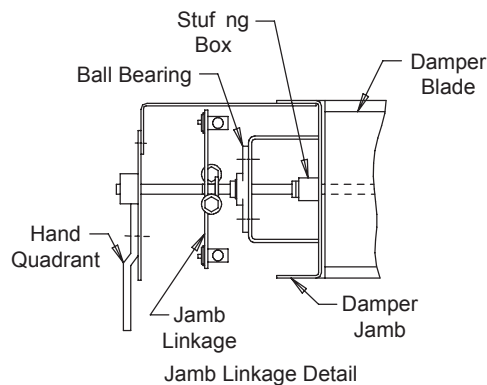
Corten Material

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided by inside dimension.

DAMPER SIZES

Panels	Min Panel (ID)	Max Single Panel (ID)
ID54	6"W x 6"H Single Blade 6"W x 12"H Opposed Blades	60"W x 96"H



Optional Flange with Holes
(Must Specify Dimensions C-K)

MODEL ID54

10" Deep • Airfoil Blade • 800°F Max. Temperature • Up to 15 in.wg Static Pressure • Industrial Damper

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MODEL ID55

10" Deep • Airfoil Blade • 400°F Max. Temperature • Clean Air Applications Industrial Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 2" x 10" x 2" 12-GA galvanized steel formed channel frame

BLADE: .080" extruded aluminum; 8" wide

JAMBS: .093" thick; extruded 6063-T5 aluminum

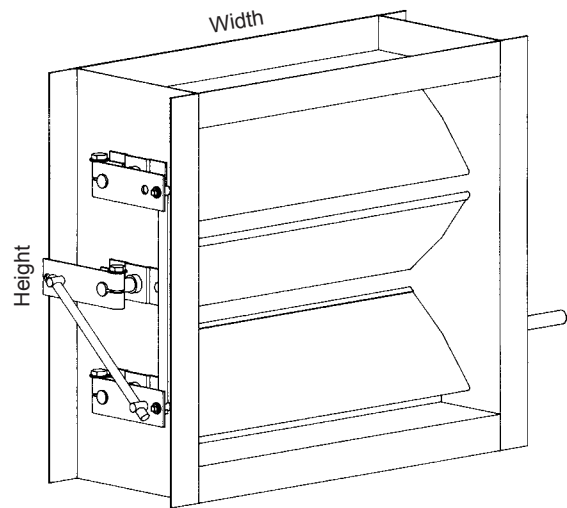
SHAFT: 3/4" dia. plated steel stub shaft with a positive interlock into blade section

LINKAGE: Formed 12-GA galvanized steel; Trunnion is a machined pivot of plated steel with a 1/2" dia. plated steel interconnecting rod

OPERATOR: Manual hand quadrant or lever arm for motor actuator

FINISH: Mill

TEMP. LIMITS: 400°F



OPTIONS

Stainless Steel Blade or Jamb Seals

Stuffing Boxes and Replaceable Packing

Variable Flange Sizes

Perimeter Holes - One Flange or Both Flanges

Actuators - Electric or Pneumatic

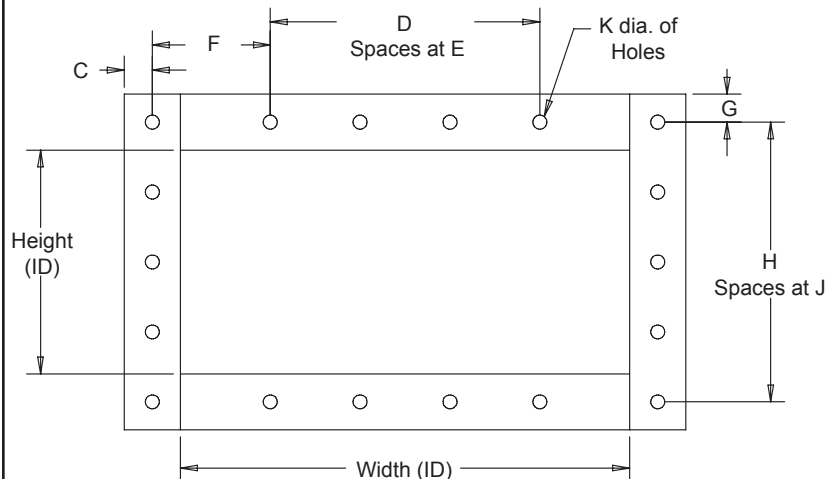
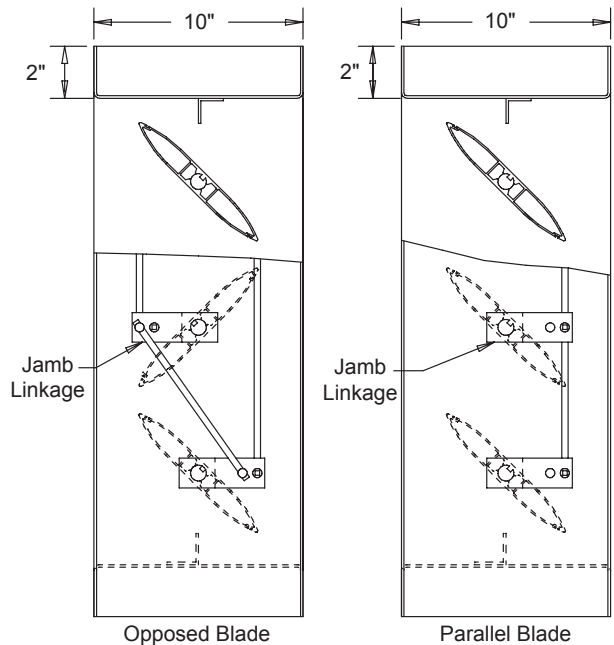
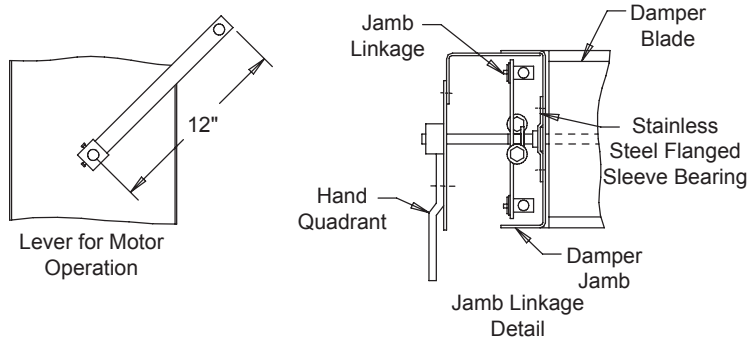
Finish - Baked Enamel, Kynar

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided by inside dimension.

DAMPER SIZES

Panel	Min Panel (ID)	Max Single Panel (ID)
ID55	12"W x 8"H Single Blade 12"W x 16"H Opposed Blade	60"W x 96"H



Optional Flange with Holes
(Must Specify Dimensions C-K)

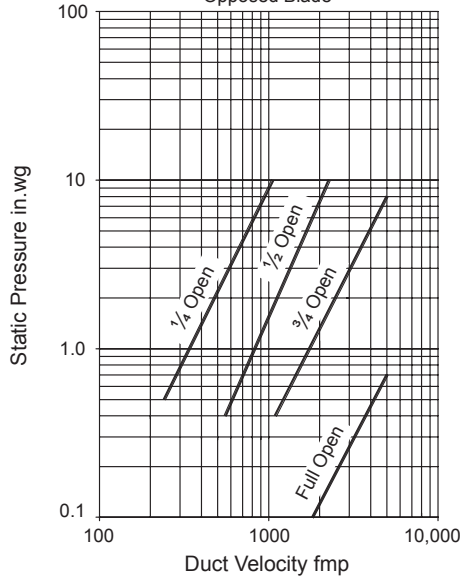
MODEL ID55

10" Deep • Airfoil Blade • 400°F Max. Temperature • Clean Air Applications Industrial Damper

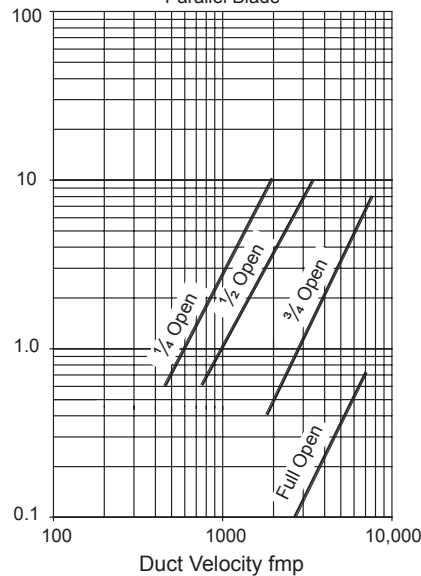
Pressure Drop:

Pressure drop curves listed are based on AMCA 500, using test set up Fig. 5.3 for damper installed with duct upstream and downstream. Static pressures are corrected to .075 lb/cu.ft. air density.

Pressure Drop vs. Duct Velocity
42"W x 42"H (Inside Dimension)
Opposed Blade



Pressure Drop vs. Duct Velocity
42"W x 42"H (Inside Dimension)
Parallel Blade



Velocity Limitations:

The table below lists the maximum allowable velocity for a given maximum damper size. When application requirements exceed the recommendations listed in the table, select another model or consult the factory.

Maximum Allowable Velocity		
≤ 3000 fpm	4000 fpm	5000 fpm
Damper Sizes		
12"W x 9"H	12"W x 9"H	12"W x 9"H
60"W x 96"H	60"W x 72"H	60"W x 54"H

Leakage:

Air leakage quantities shown in the chart are results of tests per AMCA Standard 500 and are shown at 1 in.wg differential pressure and corrected to .075 lb/cu.ft. air density.

Air Leakage cfm

	Width									
Height		12	18	24	30	36	42	48	54	60
	12	12	16	20	22	24	28	32	34	36
	24	20	24	28	32	36	42	48	49	50
	36	30	35	42	48	54	57	60	68	75
	48	40	44	48	54	60	70	80	90	100
	60	50	55	60	67	75	87	100	112	125
	75	60	65	65	80	90	105	120	135	150
	84	70	77	84	95	105	122	140	158	175
	96	80	88	90	108	120	140	160	180	200

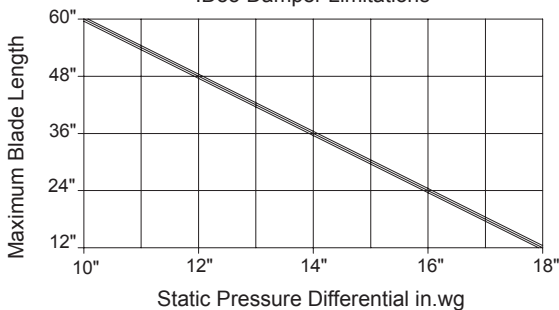
For determining leakage values greater than 1 in.wg to a maximum of 10 in.wg use the multiplier correction chart below.

Static Pressure	2	3	4	5	6	7	8	9	10
Multiplier Correction Factor	1.3	1.5	1.6	1.8	2.0	2.3	2.6	2.8	3.0

Air Leakage ratings are based on AMCA Standard 500 using test set up 5.4 with a damper closing torque applied to the damper of 31 in.lbs/sq.ft. of damper area for a size 60"W x 96"H, with a minimum of 45 in.lbs/sq.ft. of damper area for a size 60"W x 8"H.

Damper air leakage shown is based upon publishing only the most conservative leakage results for the ABI model ID55 industrial damper for an entire range of damper sizes.

ID55 Damper Limitations



To ensure proper damper operation and air leakage performance for this damper design. The static pressure/blade length limits shown provide the user with this information and in addition provides a relationship between damper cost and the application.

The model ID55 damper design at a blade length of 60" has a maximum allowable blade deflection of L/360 for the static pressure indication on the chart. At reduced blade lengths higher static pressure limits can be attained without sacrificing damper operating and performance characteristics.

MODEL AC580

Single Thickness Blade • 250°F Max. Temperature • Industrial Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: Fabricated steel channel; Channel depth equal to blade diameter of 10" and less

BLADE: Single thickness with reinforcing gussets welded to blade parallel to airflow as required

SHAFTS: Plated steel continuous length welded to blade

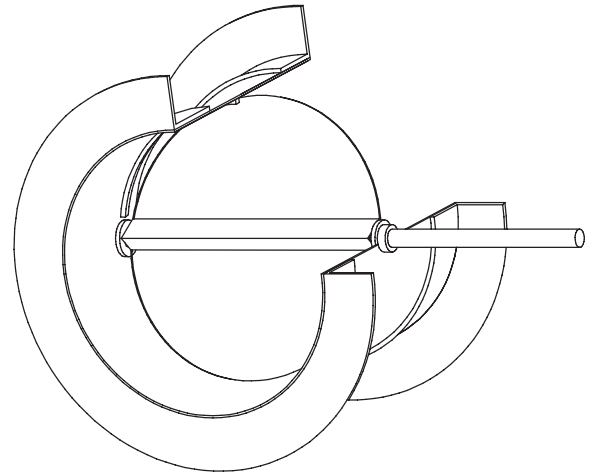
BEARINGS: Sintered stainless steel flanged sleeve pressed in the frame

STOP: shall be welded to interior perimeter of sleeve; 1/4" x 1/4" metal bar for sizes ≤ 12" dia.; 1/4" x 1/2" metal bar for sizes > 12" dia.

OPERATOR: Extended shaft 6" long beyond frame flanges

FINISH: Mill

TEMP. LIMITS: 250°F; Consult factor for temp. > 250°F



OPTIONS

Stainless Steel

Low Leakage Seal System

Stuffing Boxes and Replaceable Packing

Ball Bearings

Perimeter Holes - One Flange or Both Flanges

Finishes - Baked Enamel, Kynar

Other Materials

DAMPER SIZES

Inside Diameter	Frame		Blade Thickness	Shaft Diameter
	Depth	Flanges		
6"-11"	10-GA	1 1/4" x 1 1/4" x 1/8"	12-GA	1/2"
12"	10" 10-GA	1 1/2" x 1 1/2" x 1/8"	12-GA	1/2"
13"-15"	10" 10-GA	1 1/2" x 1 1/2" x 1/8"	10-GA	3/4"
16"-24"	10" 10-GA	1 1/2" x 1 1/2" x 3/16"	10-GA	3/4"
25"-36"	10" 10-GA	2" x 2" x 3/16"	10-GA	1"
37"-48"	10" 10-GA	2" x 2" x 3/16"	10-GA with 2 gussets	1"

MODEL AC580

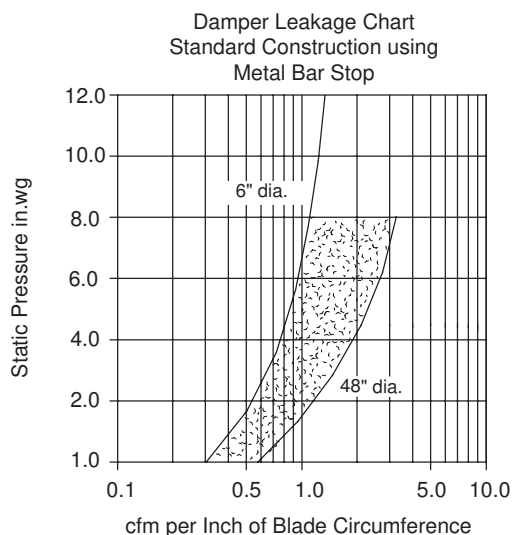
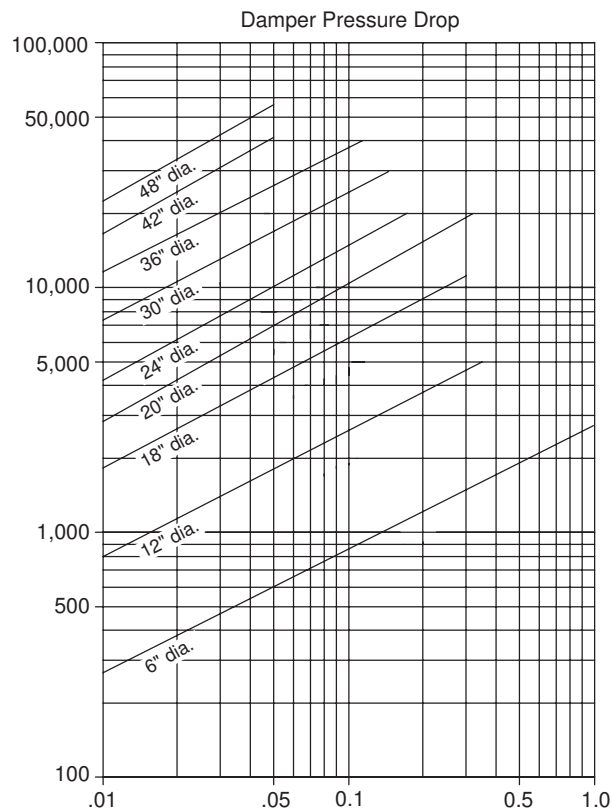
Single Thickness Blade • 250°F Max. Temperature • Industrial Damper

Pressure and Velocity Limitations:

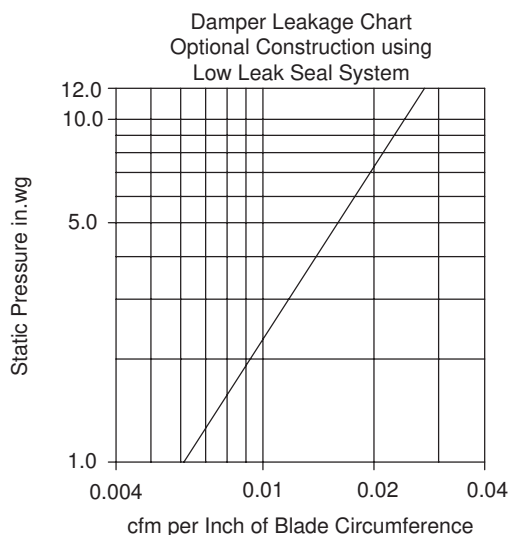
The model AC580 damper has been designed to operate satisfactorily within the limits shown below consult the factory when applications exceed the limits shown.

Damper Diameter	Maximum System Static Pressure	Maximum System Velocity
6" - 12"	12 in.wg	6000
13" - 24"	10 in.wg	6000
25" - 36"	8 in.wg	5000
37" - 48"	8 in.wg	4000

Damper performance for pressure drop and air leakage is based on AMCA Standard 500 using Fig. 5.3 (damper installed with duct upstream and downstream for pressure drop) and Fig 5.4 for air leakage. Static Pressure and cfm are corrected to .075 lb/cu.ft air density.



Leakage results shown are based on tests using various damper sizes. The shaded area expected leakage range for standard damper operating conditions and sizes.



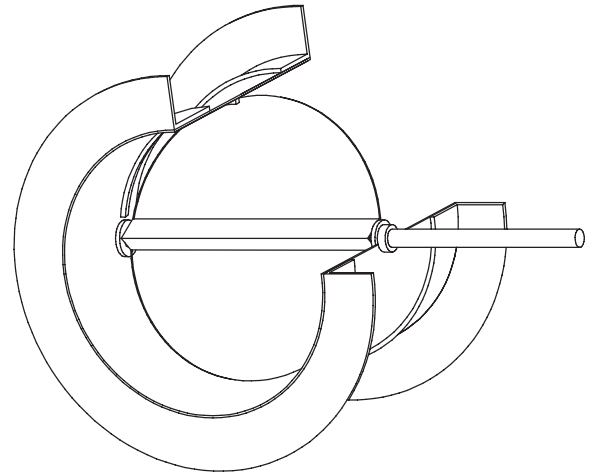
Low leakage seal system consists of rubber seal bolted to blade, stuffing box with packing gland material, and outboard bearing.

MODEL AC581

Single Thickness Blade • 250°F Max. Temperature • Industrial Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** Fabricated steel channel; Channel depth equal to blade diameter of 10" and less
- BLADE:** Single thickness with reinforcing gussets welded to blade parallel to airflow as required
- SHAFTS:** Plated steel continuous length welded to blade
- BEARINGS:** Sintered stainless steel flanged sleeve pressed in the frame
- STOP:** Shall be welded to interior perimeter of sleeve; ¼" x ¼" metal bar for sizes ≤ 12" dia.; ¼" x ½" metal bar for sizes > 12" dia.
- OPERATOR:** Extended shaft 6" long beyond frame flanges
- FINISH:** Mill
- TEMP. LIMITS:** 250°F; Consult factor for temp. > 250°F



OPTIONS

Stainless Steel
 Low Leakage Seal System
 Stuffing Boxes and Replaceable Packing
 Ball Bearings
 Perimeter Holes - One Flange or Both Flanges
 Finishes - Baked Enamel, Kynar
 Other Materials

DAMPER SIZES

Inside Diameter	Frame		Blade Thickness	Shaft Diameter
	Depth	Flanges		
6" - 9"	10-GA	1¼" x 1¼" x ⅛"	10-GA	½"
10" - 11"	10" 10-GA	1¼" x 1¼" x ⅛"	10-GA	¾"
12"	10" 10-GA	1½" x 1½" x ⅛"	10-GA	1"
13" - 15"	10" 10-GA	1½" x 1½" x ⅛"	7-GA	1"
16" - 24"	10" 10-GA	1½" x 1½" x 3/16"	7-GA	1"
25" - 36"	10" 10-GA	2" x 2" x 3/16"	7-GA with 2 gussets	1"
37" - 48"	10" 10-GA	2" x 2" x 3/16"	7-GA with 3 gussets	1"

MODEL AC581

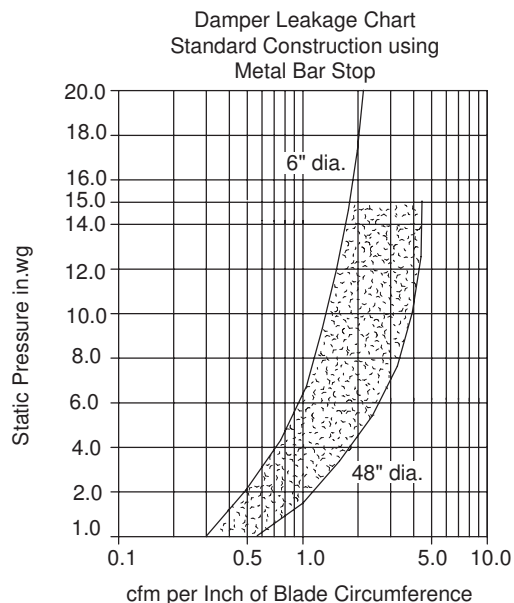
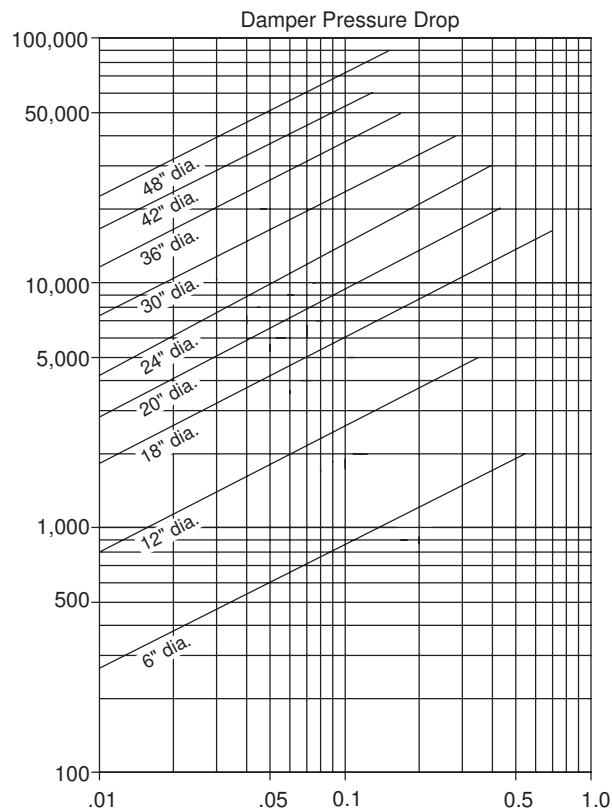
Single Thickness Blade • 250°F Max. Temperature • Industrial Damper

Pressure and Velocity Limitations:

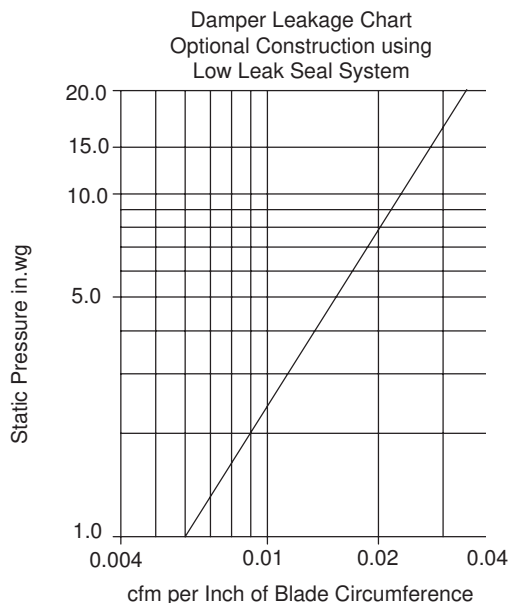
The model AC581 damper has been designed to operate satisfactorily within the limits shown below consult the factory when applications exceed the limits shown.

Damper Diameter	Maximum System Static Pressure	Maximum System Velocity
6" - 12"	20 in.wg	7000
13" - 24"	17 in.wg	7000
25" - 36"	16 in.wg	7000
37" - 48"	15 in.wg	7000

Damper performance for pressure drop and air leakage is based on AMCA Standard 500 using Fig. 5.3 (damper installed with duct upstream and downstream for pressure drop) and Fig 5.4 for air leakage. Static Pressure and cfm are corrected to .075 lb/cu.ft air density.



Leakage results shown are based on tests using various damper sizes. The shaded area expected leakage range for standard damper operating conditions and sizes.



Low leakage seal system consists of rubber seal bolted to blade, stuffing box with packing gland material, and outboard bearing.

AIR BALANCE SUBMITTAL DATA**Supplemental Information****Control Damper Panel & Jackshaft Arrangements****Volume Control Damper Models: AC1, AC2, 515, 516, 525, 526, AC18, AC19**

- Panel and jackshaft arrangements are produced for assembly sizes through 240"W x 144"H. For larger sizes, unequal section sizes, or other special arrangements, consult the factory.
- Assemblies that are both multiple panels wide and multiple panels high require additional structural support. Structural supports and mounting accessories are not factory supplied.
- Damper panels that require double blade-to-blade linkage (> 30" wide) will be supplied with two jackshaft-to-drive blade linkage sets. In lieu of double drive linkage, single drive linkage can be utilized if the drive blade is reinforced with a blade stiffener.
- Internal actuators are factory mounted and require factory supplied jackshafts. (Exception: Foot mounted Barber Colman actuators on single panel dampers do not require jackshaft.) The damper height must meet guidelines for internal mount. The jackshaft runs the full width of the damper.
- External actuators ship loose and do not require factory supplied jackshaft. (Exception: External actuators are factory mounted and require factory supplied jackshafts on dampers ordered with a sleeve or sideplate.) If jackshaft is ordered, but actuators are field supplied, one additional drive arm per jackshaft run will be factory supplied.
 - If jackshaft and actuators are factory supplied, the jackshafts will extend beyond the dampers as follows:
 - 10" for #6 Siemens pneumatic actuator.
 - 6" for all other standard actuators.
 - If jackshaft is factory supplied, but actuators are field supplied, the jackshaft will extend beyond the damper 10".
- Single panel dampers ordered without jackshaft will be supplied with one extended shaft kit. Double panel wide by single panel high dampers ordered without jackshaft will be supplied with two extended shaft kits. Single panel wide by double panel high dampers ordered without jackshaft will be supplied with two extended shaft kits. Double panel wide by double panel high dampers ordered without jackshaft will be supplied with four extended shaft kits. Multiple panel dampers without jackshaft are not interconnected.
- Damper assemblies with multiple factory supplied actuators are not wired together.
- Damper assemblies that exceed maximum single ship section limitations will ship in sections and are provided with splicing materials. Reference page 6 for splicing instructions.
- Multiple panel disassembly is available if individual panel shipment or ship loose jackshaft is required.

PANELS & JACKSHAFT

Models	Maximum Panel
AC1/AC2	48"W x 72"H
515/516	48"W x 72"H
525/526	60"W x 72"H
AC18/AC19	60"W x 72"H

Assembled Ship Section Maximums

48 sq. ft.

108" wide

96" high

*Assemblies > 48 sq.ft. will be split
in height before width.

1/2" Jackshaft Maximum "Per Run"	
With Seals	16 sq.ft.
Without Seals	24 sq.ft.
Width	96"

EXAMPLES**Example #1**

80"W x 30"H

- 2 panels wide x 1 panel high
- $(80 \times 30) / 144 = 16.7$ square feet face area.
- This will ship in one 2x1 section.
 - Dampers ordered without jackshaft will be provided with 2 extended shaft kits.
 - Dampers ordered with jackshaft and without seals will be provided with 1/2" diameter jackshaft, since the face area is ≤ 24 square feet.
 - Dampers ordered with jackshaft and with seals will be provided with 1" diameter jackshaft, since the face area is > 16 square feet.

Example #2

45"W x 125"H

- 1 panel wide x 2 panels high
- $(45 \times 125) / 144 = 39.1$ square feet face area.
- This will ship in two 1x1 sections.
 - Dampers ordered without jackshaft will be provided with two extended shaft kits.
 - Dampers ordered with jackshaft and without seals will be interconnected vertically, since the face area is ≤ 45 square feet. They will be provided with 1" diameter jackshaft. The interconnect arms and hardware will ship attached and interconnect rod will ship loose.
 - Dampers ordered with jackshaft and with seals will not be interconnected vertically, since the face area is > 35 square feet. They will be provided with 1" diameter jackshaft, since the face area is > 32 square feet.

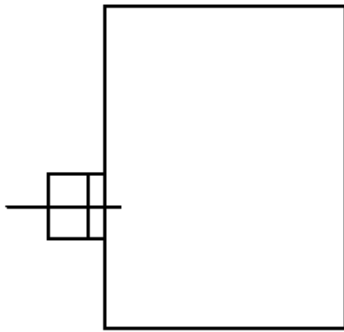
Example #3

200"W x 100"H

- 5 panels wide x 2 panels high
- $(200 \times 100) / 144 = 138.9$ square feet face area.
- Dampers will ship in two 3x1 sections and two 2x1 sections.
 - Dampers ordered without jackshaft will be supplied with blade brackets on each panel for field connection.
 - Dampers ordered with jackshaft will be provided with 1" diameter jackshaft. The splice arms and hardware will ship attached.

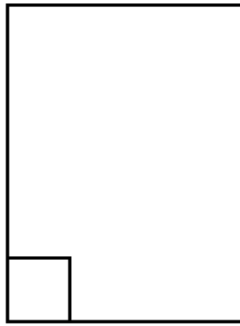
AIR BALANCE SUBMITTAL DATA**1 Panel Wide x 1 Panel High**

External mount



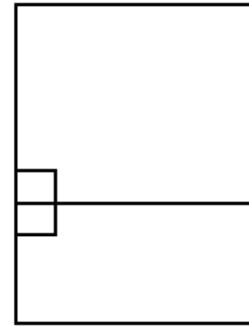
No Jackshaft Required
1 Extended Shaft Kit

Internal mount

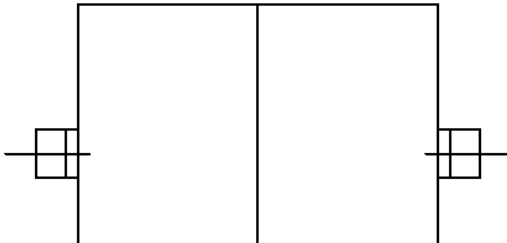


No Jackshaft Required
Foot Mounted Barber
Colman Actuator Only

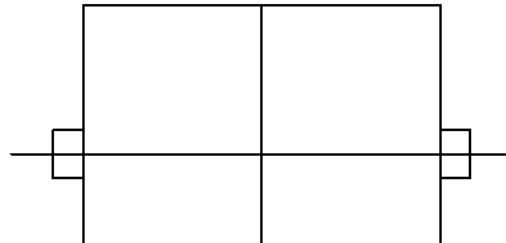
Internal mount



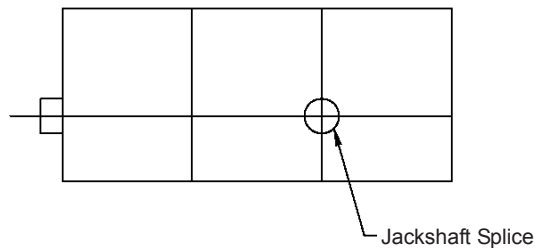
Jackshaft	1/2" dia.	1" dia.
Damper with seals	≤ 16 sq.ft.	> 16 sq.ft.
Damper w/out seals	≤ 24 sq.ft.	> 24 sq.ft.

2 Panels Wide x 1 Panel HighExternal Mount
(Individual Operation)

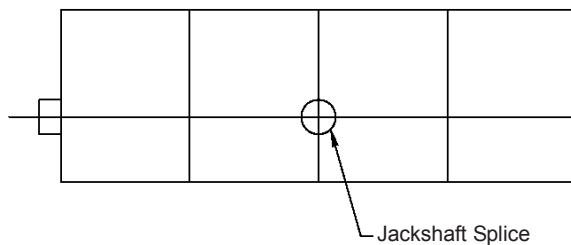
No Jackshaft Required
2 Extended Shaft Kits

External or Internal Mount
(Interconnected Horizontally)

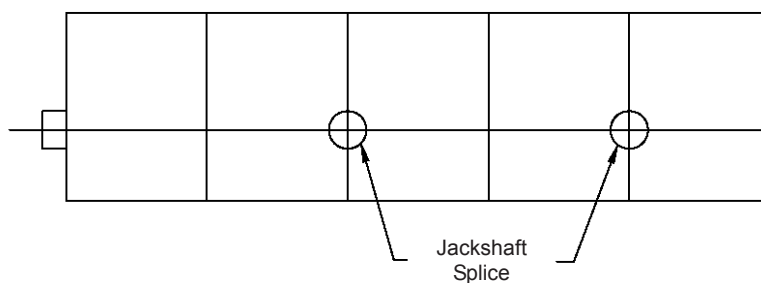
Jackshaft	1/2" dia.	1" dia.
Damper with seals	≤ 16 sq.ft.	> 16 sq.ft.
Damper w/out seals	≤ 24 sq.ft.	> 24 sq.ft.

3 Panels Wide x 1 Panel HighExternal or Internal Mount
(Interconnected Horizontally)

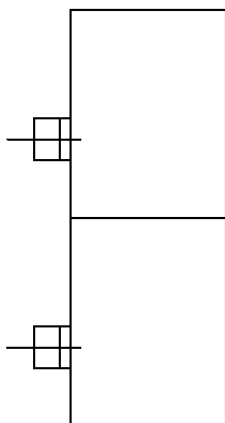
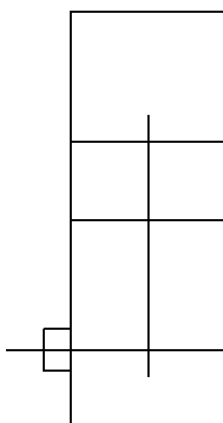
1" dia. Jackshaft

AIR BALANCE SUBMITTAL DATA**4 Panels Wide x 1 Panel High**External or Internal Mount
(Interconnected Horizontally)

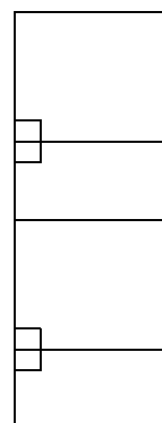
1" dia. Jackshaft

5 Panels Wide x 1 Panel HighExternal or Internal Mount
(Interconnected Horizontally)

1" dia. Jackshaft

1 Panel Wide x 2 Panels HighExternal Mount
(Individual Operation)No Jackshaft Required
2 Extended Shaft KitsExternal or Internal Mount
(Interconnected Vertically)

Jackshaft	1" dia.
Damper with seals	≤ 35 sq.ft.
Damper w/out seals	≤ 45 sq.ft.

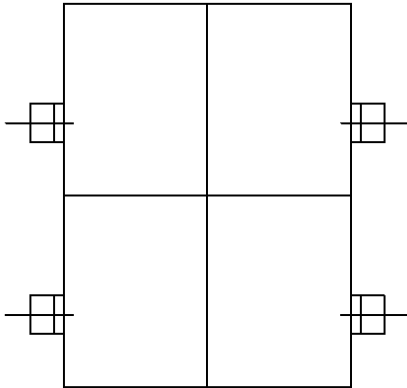
Internal Mount
(Individual Operation)

Jackshaft	1/2" dia.	1" dia.
Damper with seals	≤ 32 sq.ft.	> 32 sq.ft.
Damper w/out seals	≤ 48 sq.ft.	> 48 sq.ft.

AIR BALANCE SUBMITTAL DATA

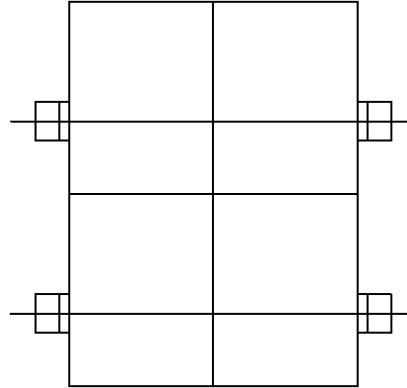
2 Panels Wide x 2 Panels High

External or Internal Mount
(Individual Operation)



Jackshaft	1/2" dia.	1" dia.
Damper with seals	≤ 32 sq.ft.	> 32 sq.ft.
Damper w/out seals	≤ 48 sq.ft.	> 48 sq.ft.

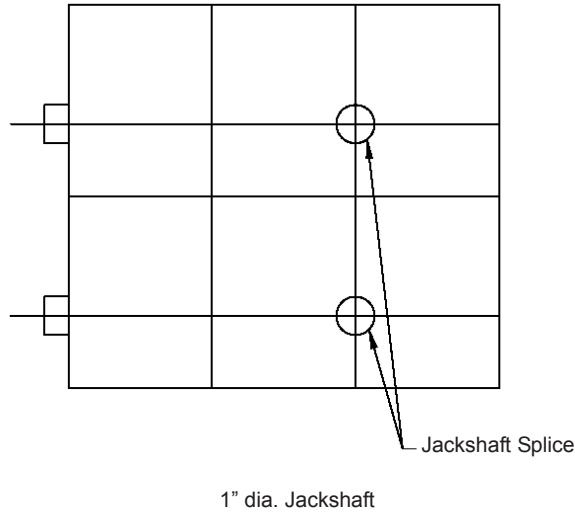
External or Internal Mount
(Interconnected Horizontally)



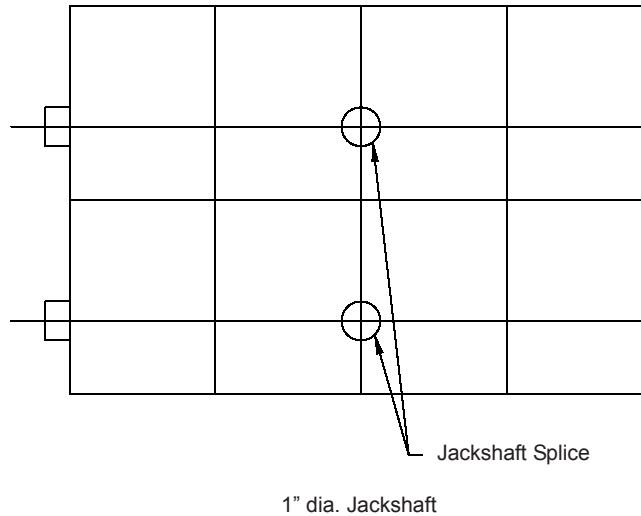
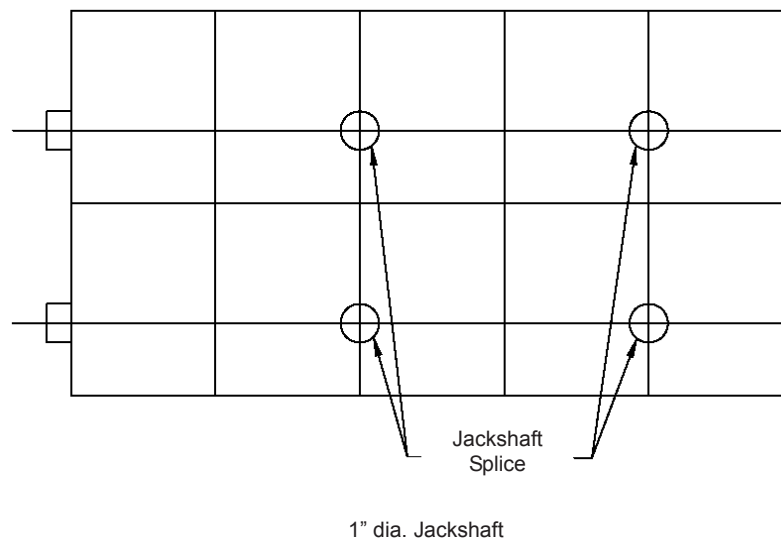
Jackshaft	1/2" dia.	1" dia.
Damper with seals	≤ 32 sq.ft.	> 32 sq.ft.
Damper w/out seals	≤ 48 sq.ft.	> 48 sq.ft.

3 Panels Wide x 2 Panels High

External or Internal Mount
(Interconnected Horizontally)

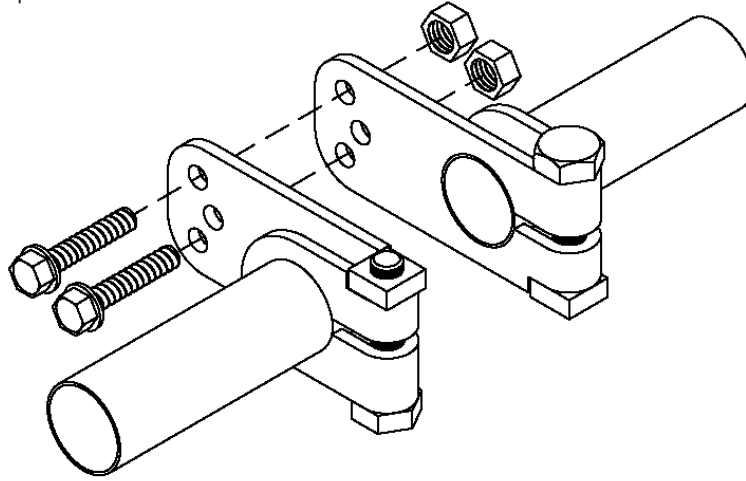


1" dia. Jackshaft

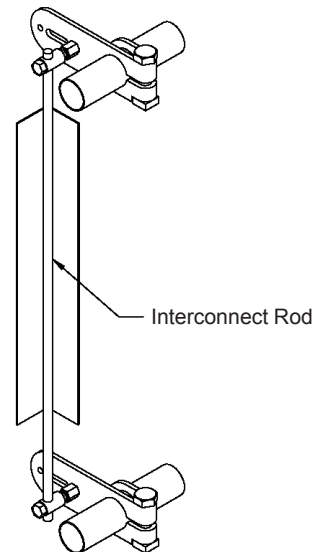
AIR BALANCE SUBMITTAL DATA**4 Panels Wide x 2 Panels High**External or Internal Mount
(Interconnected Horizontally)**5 Panels Wide x 2 Panels High**External or Internal Mount
(Interconnected Horizontally)

MULTIPLE SHIP SECTION JACKSHAFT SPLICE

1. Ensure both damper sections are in the closed position.
2. Attach the splice arms together using the nuts and bolts provided (attached to one of the splice arms).
3. If the damper sections do not close simultaneously, unclamp one splice arm on the jackshaft, adjust as required, and re-clamp.
4. Verify proper open and close operation

**MULTIPLE SHIP SECTION VERTICAL INTERCONNECT**

1. Slide the interconnect rod through the barrels attached to each interconnect arm.
2. Ensure both damper sections are in the closed position.
3. Clamp the barrel set screw onto the interconnect rod.
4. Verify proper open and close operation.



Face & Bypass Con gurations

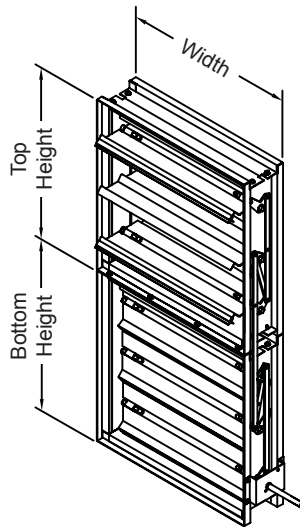
Control Damper Models: AB1, AB2, AC1, AC2, AC515, AC516

APPLICATION

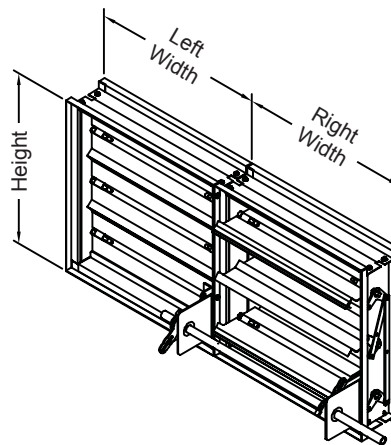
Face and Bypass dampers are connected for simultaneous blade action, causing one damper to open and one to close. The damper assemblies are FBV - Vertical, FBH - Horizontal, and FBP - Perpendicular.

NOTES

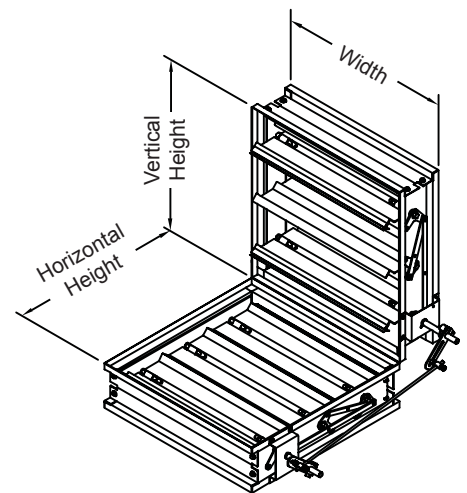
1. Unless otherwise speci ed overall damper assembly will be fabricated $\frac{1}{4}$ " under listed size.
2. Style FBV and FBV have extended shaft drive as standard. For multiple section wide units, jackshafting will be required.
3. Style FBH requires jackshaft. FBH is not available for the AB1 and AB2.
4. The many linkage con gurations cannot all be shown here. If information on exact con guration is required, consult factory. In some cases jackshafting rotates less that 90°, motor linkage must be adjusted.
5. The section that closes when operator is de-energized must be speci ed on order for factory installed operators.
6. See standard submittal drawings for damper details.



FBV
Vertical



FBH
Horizontal
(As viewed from the jackshaft side.)



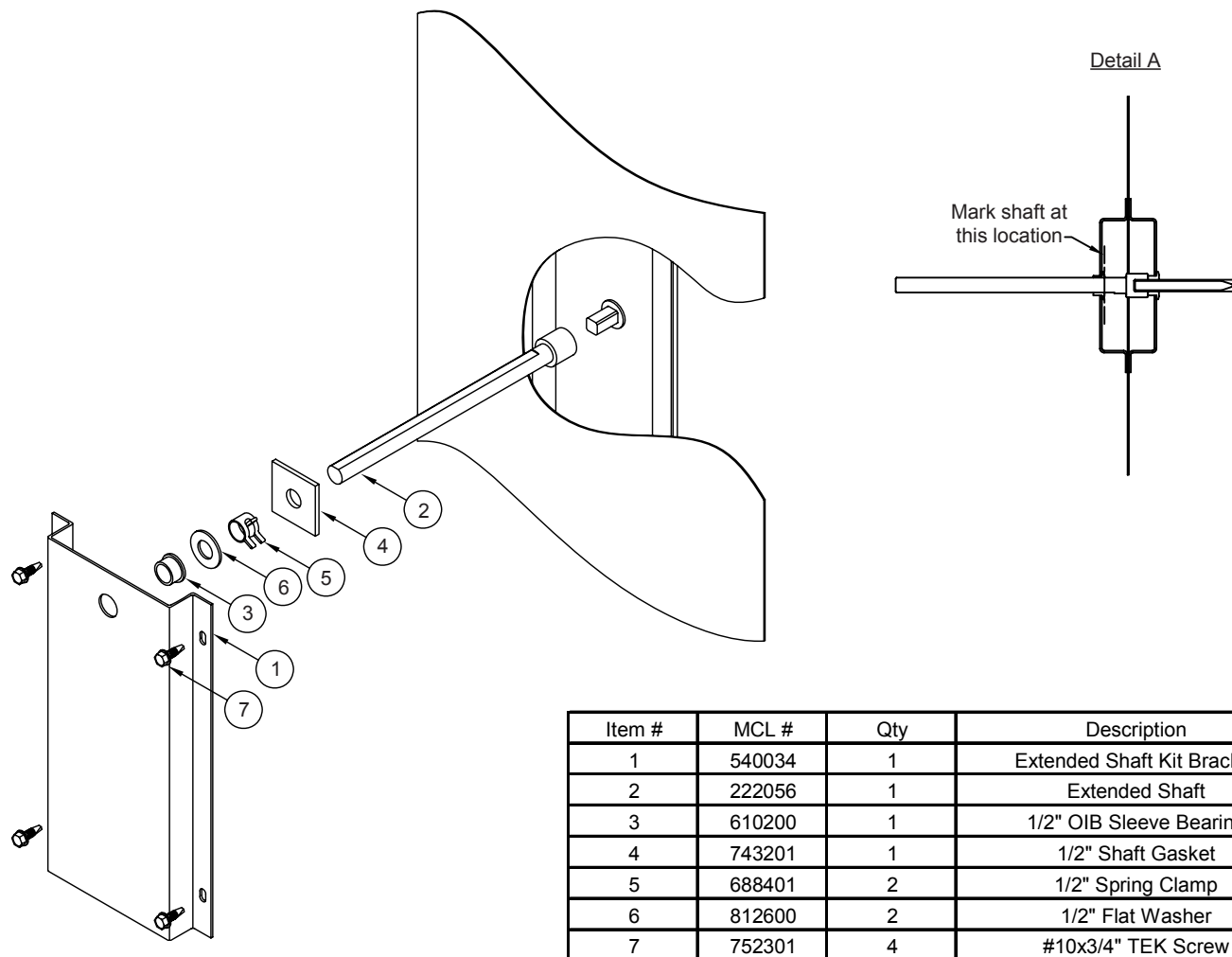
FBP
Perpendicular

Face & Bypass Configurations

Control Damper Models: AB1, AB2, AC1, AC2, AC515, AC516

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Extended Shaft Kit



INSTALLATION

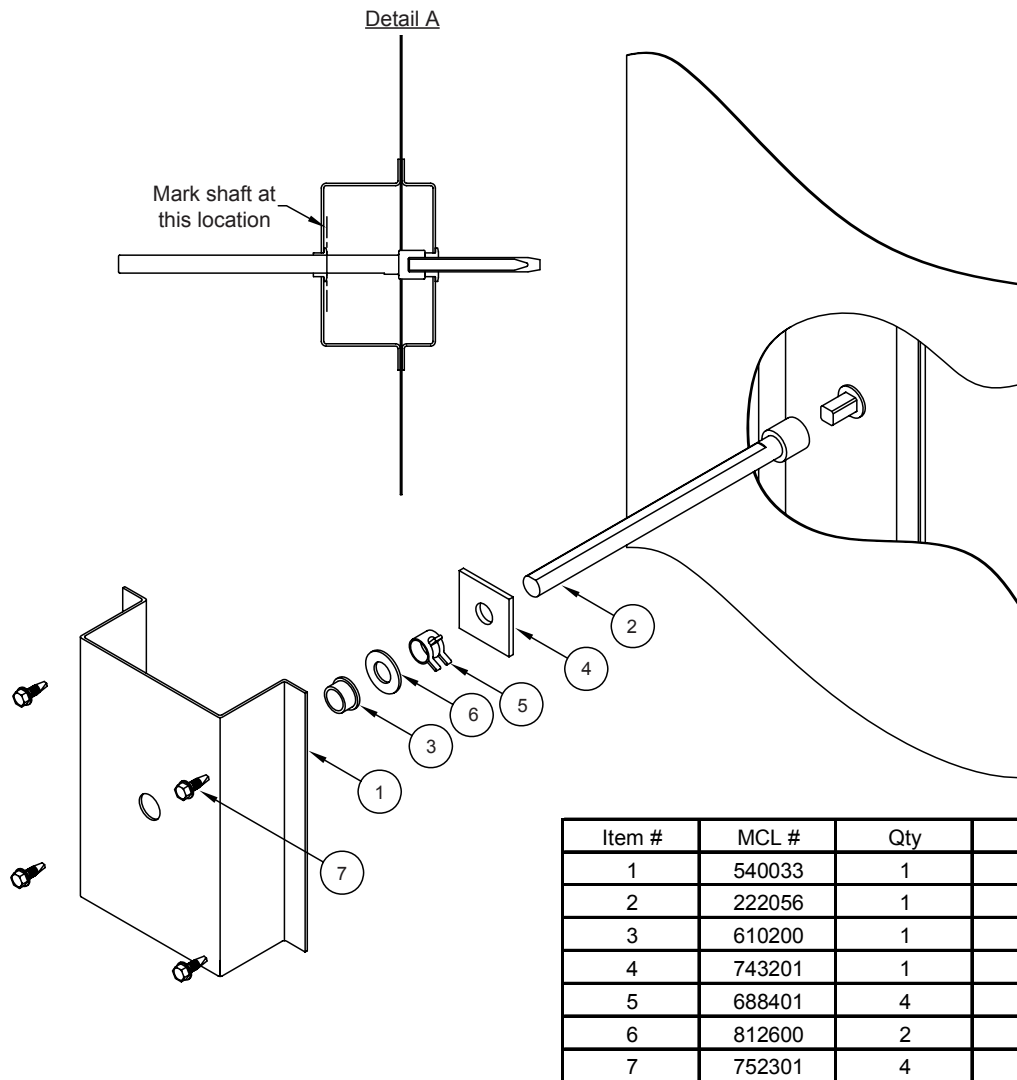
1. If damper is installed in sleeve or duct, drill clearance hole for extended shaft so that it can be attached to the drive axle.
2. Insert the bearing (Item 3) into the hole in the bracket (Item 1), so that it is oriented as shown.
3. Slide the extended shaft (Item 2) through the bearing/bracket assembly, so that it is oriented as shown.
4. Temporarily attach the extended shaft onto the drive blade axle, so that the entire assembly is properly seated. Mark the drive shaft where the shaft rests against the bracket. (Reference Detail A.)
5. Remove the bracket assembly and apply the shaft gasket (Item 4), spring clamp(s) (Item 5), and spacer washer(s) (Item 6) as needed between the plug-on head and the mark, so that the plug-on axle is trapped once the assembly is complete.
6. Attach the assembly using the screws (Item 7) through the bracket.

*Note: The flat on the plug-on drive shaft should be oriented so it is parallel to the blade for damper closure reference. Rotate the extended shaft to ensure free rotation. If binding occurs, loosen the mounting screw, adjust the location of the assembly, and retighten the mounting screws. Repeat this process until the extended shaft rotates freely.

Extended Shaft Kit

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2" Standoff Shaft Kit



INSTALLATION

1. If damper is installed in sleeve or duct, drill clearance hole for extended shaft so that it can be attached to the drive axle.
2. Insert the bearing (Item 3) into the hole in the bracket (Item 1), so that it is oriented as shown.
3. Slide the extended shaft (Item 2) through the bearing/bracket assembly, so that it is oriented as shown.
4. Temporarily attach the extended shaft onto the drive blade axle, so that the entire assembly is properly seated. Mark the drive shaft where the shaft rests against the bracket. (Reference Detail A.)
5. Remove the bracket assembly and apply the shaft gasket (Item 4), spring clamp(s) (Item 5), and spacer washer(s) (Item 6) as needed between the plug-on head and the mark, so that the plug-on axle is trapped once the assembly is complete.
6. Attach the assembly using the screws (Item 7) through the bracket.

*Note: The flat on the plug-on drive shaft should be oriented so it is parallel to the blade for damper closure reference. Rotate the extended shaft to ensure free rotation. If binding occurs, loosen the mounting screw, adjust the location of the assembly, and retighten the mounting screws. Repeat this process until the extended shaft rotates freely.

2" Standoff Shaft Kit

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Standard Installation

Multi-Blade Control and Balancing Dampers

GENERAL

Upon receipt of the damper(s) at the site, inspect all items; note on Bill of Lading. Unpack all dampers carefully. Immediately note any damage and inform your representative. Do not install; it is easier to repair a damper on the floor than up in the duct.

Do not stack dampers on each other or allow debris to fall on them. Avoid rehandling if possible; install each unit as soon as possible after unpacking.

DAMPER INSTALLATION

Prior to installing the damper, inspect the ductwork and surrounding area for any obstructions that might interfere with the linkage, blade rotation or actuator mounting. Care must be taken not to drop, drag, crush, or apply excessive bending twisting, racking or skewing loads upon the damper frame, blades, linkage or accessories (see g. 1 on reverse side). Never use a chain or hook inside the damper frame for lifting, as this could damage blades, seals or frame.

- A. We recommend lubricating moving parts with dry graphite.
 - B. Manual dampers should be run through a full-open to full-close cycle by hand to insure proper operation of the damper.
 - C. Motorized dampers should be checked by a preliminary attempt to operate with the motor. If binding occurs, disconnect one end of the driving linkage (and note its exact position before-hand) to operate damper manually and check per above. Reconnect linkage and check again.
 - D. If an externally mounted operator is being utilized, a 1" diameter hole must be drilled in the duct to accommodate the operator (see g. 4 on reverse side). Locate drive blade axle. Measure from bottom of damper to center of drive blade axle. Transfer this to wall of duct and drill 1" diameter hole.
 - E. Lift panels into duct (or opening) by its frame, not by any blade or hardware. Final position must be square, straight, plumb, and without twist (see g. 1 on reverse side).
 - F. Due to shipping and handling, dampers may arrive at the site slightly racked or twisted. Dampers are to be squared and not twisted prior to installation into square duct or sleeves.
 - G. See g. 2 on reverse side for attachment methods.
 - H. Damper should be shimmed in the opening to prevent distortion of the frame by the fasteners holding it in place. Dampers with seals should be caulked to prevent leakage between the frame and duct.
 - I. Check the damper for free operation.
-

MULTIPLE-PANEL DAMPERS

Multiple-panel dampers will be tagged for ease of assembly (see g. 3 on reverse side or drawing C24278).

OPERATORS

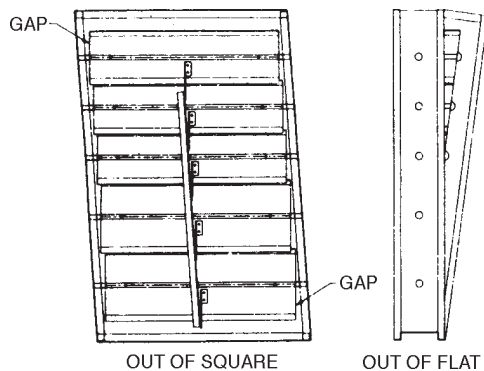
- A. An extended shaft kit (see g. 4 on reverse side) is supplied if no operator is specified.
 - B. Reference specific installation instructions supplied with damper operator for motorized dampers.
 - C. Multi-panel dampers with jackshafting; See separate instructions for installation of jackshafting when not factory installed.
-

MAINTENANCE

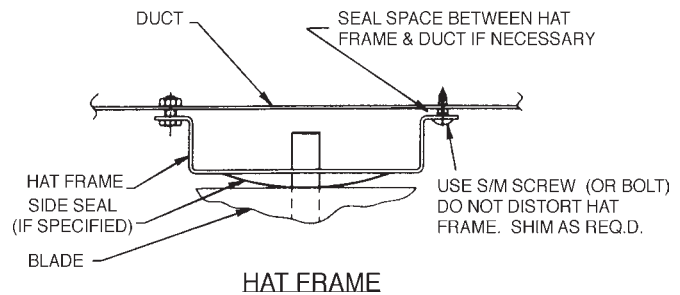
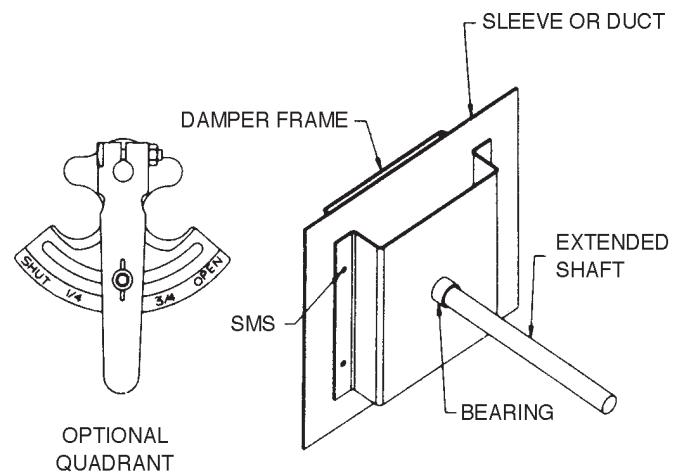
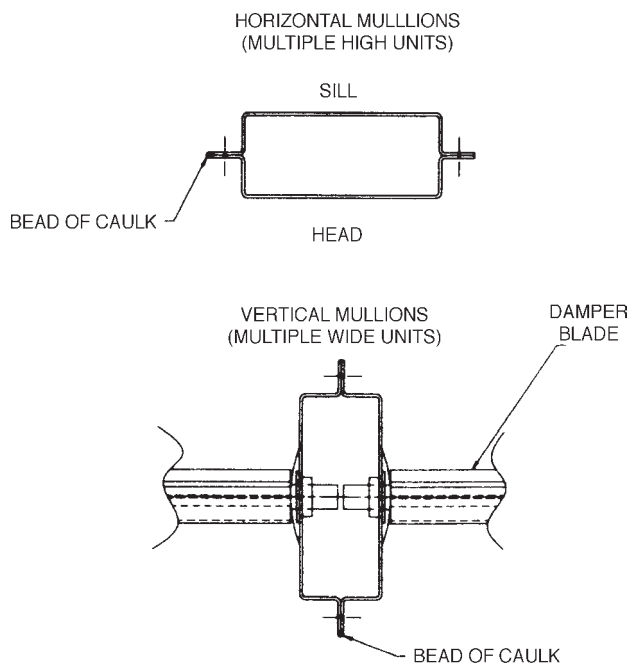
In general this unit must be kept clean and free from foreign matter that may impede normal movement and seating of blades and seals (if applicable). A cleaning schedule should be established and is entirely dependent upon the environment into which the damper is placed. The damper is basically maintenance free with the above exception and regular lubrication and seal inspection as indicated below:

BEARINGS AND LINKAGE PIVOTS: Lubricate with dry graphite as required to provide free movement.

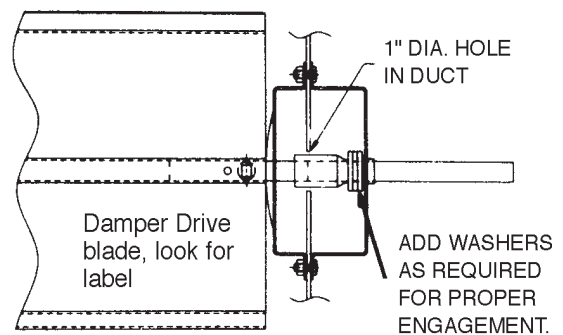
Standard Installation Multi-Blade Control and Balancing Dampers

Figure 1**Warning**

Improperly installed dampers and damper panels prevent the blades from sealing properly. Gaps between the blades indicate a damper installed out of flat. Out of square installations can cause damage to side seals and will also require excessive actuator torque.

Figure 2**Figure 4****Figure 3**

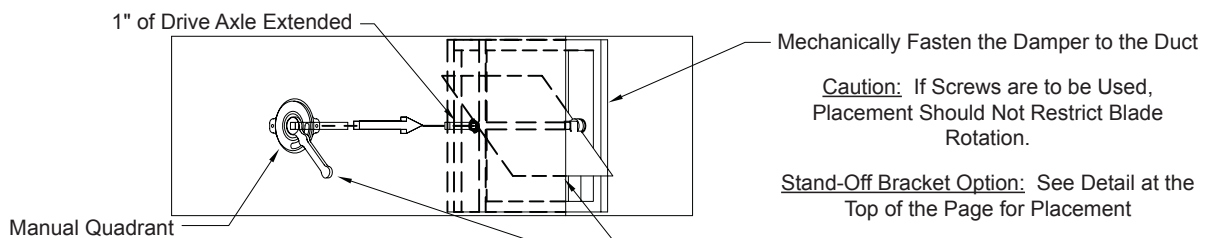
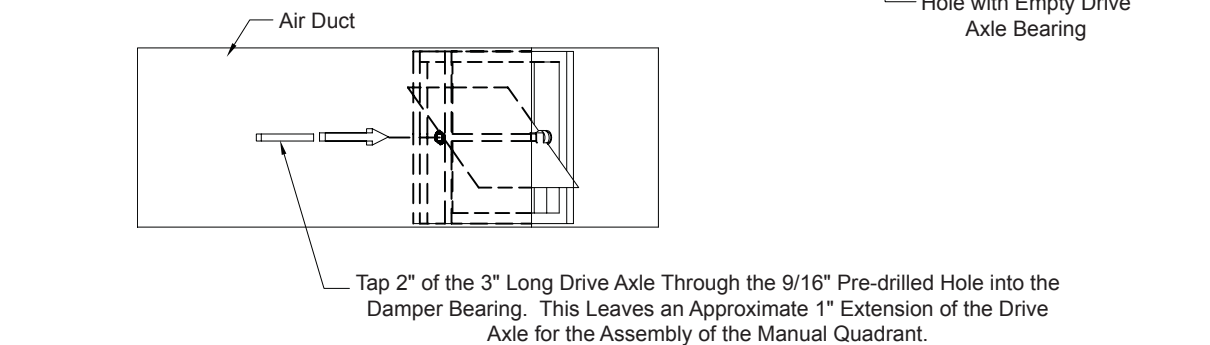
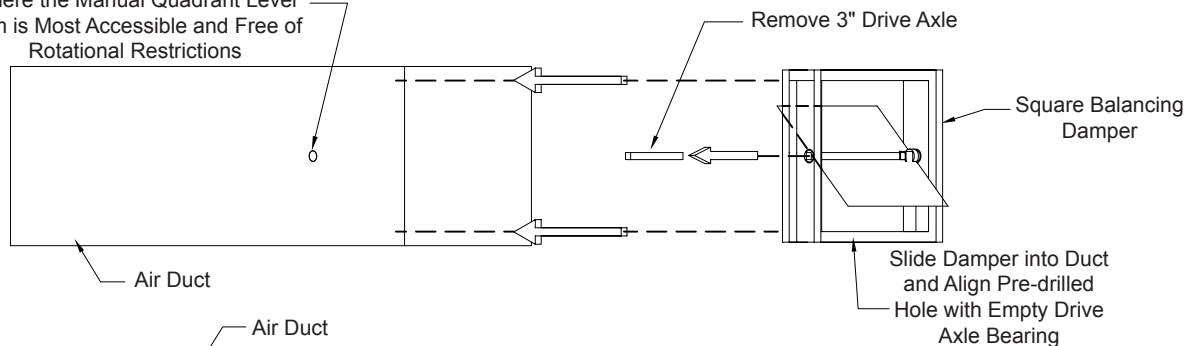
USING 1/4-20 BOLTS, WASHERS AND LOCKNUTS OR #10 SHEET METAL SCREWS, JOIN PANELS TOGETHER.

**SECTION VIEW**

Standard Installation Multi-Blade Control and Balancing Dampers

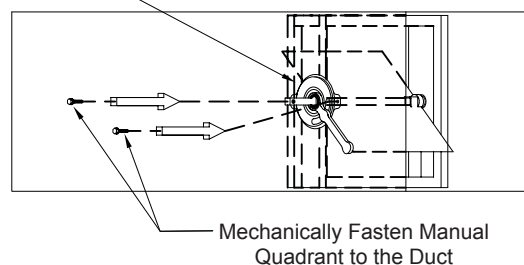


Pre-drill (9/16" dia. hole) in Duct at Manual Quadrant Mounting Location Where the Manual Quadrant Lever Arm is Most Accessible and Free of Rotational Restrictions



Align Manual Quadrant Lever Arm Parallel to Damper Blade and Slide Manual Quadrant onto Drive Axle.

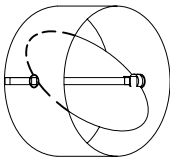
Loosen Wing Nut on the Manual Quadrant and Align Mounting Tabs Parallel to Duct Length



Note: Insure Damper is Open When Manual Quadrant Indication States Open.

Caution: If Screws are to be Used, Placement Should Not Restrict Blade Rotation.

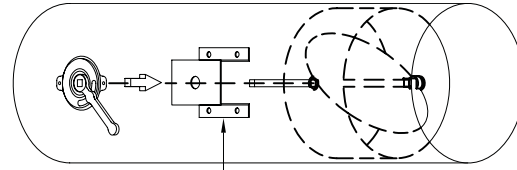
Standard Installation Multi-Blade Control and Balancing Dampers



Round Balancing Damper



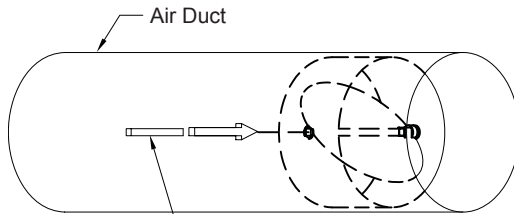
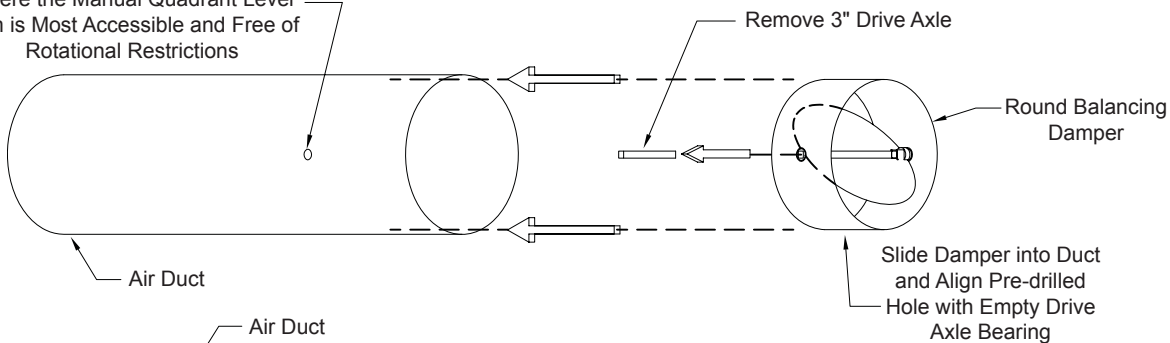
Manual Quadrant



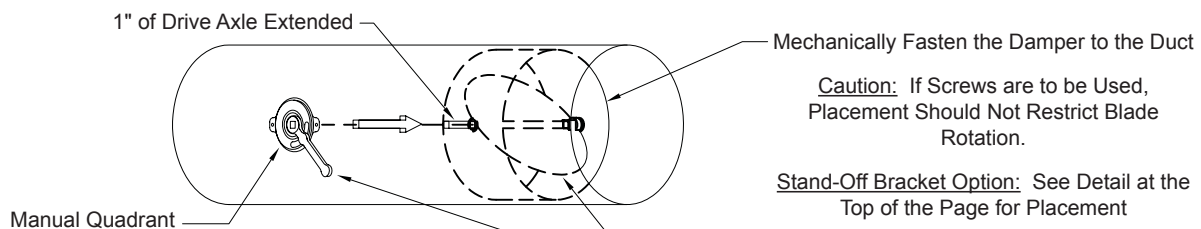
Stand-Off Bracket

Optional Stand Off Bracket

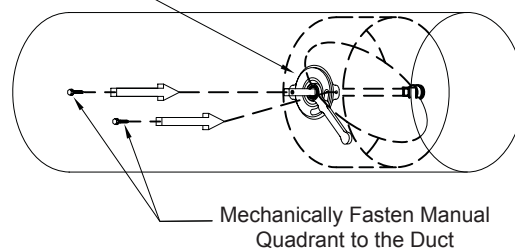
Pre-drill (9/16" dia. hole) in Duct at Manual Quadrant Mounting Location Where the Manual Quadrant Lever Arm is Most Accessible and Free of Rotational Restrictions



Tap 2" of the 3" Long Drive Axle Through the 9/16" Pre-drilled Hole into the Damper Bearing. This Leaves an Approximate 1" Extension of the Drive Axle for the Assembly of the Manual Quadrant.



Loosen Wing Nut on the Manual Quadrant and Align Mounting Tabs Parallel to Duct Length



Note: Insure Damper is Open When Manual Quadrant Indication States Open.

Caution: If Screws are to be Used, Placement Should Not Restrict Blade Rotation.



Aluminum Control Dampers

- 128 — 2" Deep, Single Thickness Blade, Aluminum Damper
- AC18/19 — 5" Deep, 4" Airfoil Blade, Aluminum Control Damper
- AC525/526 — 5" Deep, 6" Airfoil Blade, Aluminum Control Damper
- AC51/52 — 5" Deep, Airfoil Blade w/ Linkage, Aluminum Control Damper
- AC53/54 — 5" Deep, Single Thickness Blade, Aluminum Control Damper
- TB58 — 5" Thermal Break Dampers, Airfoil Blade, Aluminum Control Damper
- TB59 — 5" Thermal Break Dampers, Airfoil Blade, Aluminum Control Damper

air balance

Dampers  Louvers
UL Life Safety Products

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MODEL 128

2" Deep • Single Thickness Blade • Aluminum Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 2" x .081" thick extruded aluminum channel
BLADES: .080" single thickness formed aluminum
BEARINGS: Oilite bronze
SHAFT: 1/2" dia. plated steel
SEALS: Polyurethaned on jams
FINISH: Mill

OPTIONS

Hand Quadrants

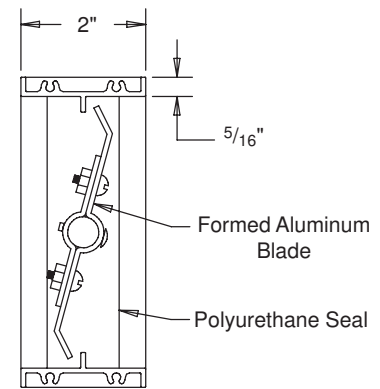
Bearings: Nylon, Celcon, or Ball

NOTES

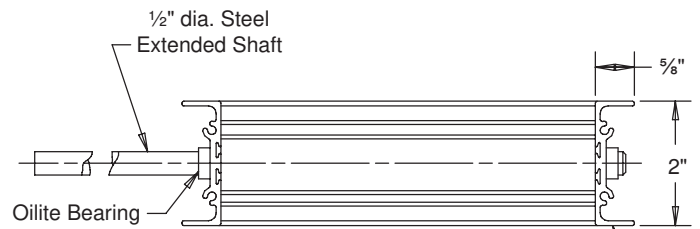
1. "A" width and "B" height are opening dimensions. Dampers are provided approximately 1/4" undersize.
2. Unites up to 48" wide shipped assembled.
2. Approximate damper weight is 4.5 lbs./sq.ft.

DAMPER SIZE

Panels	Minimum Panel	Maximum Panel
128	6"W x 3"H	36"W x 12"H

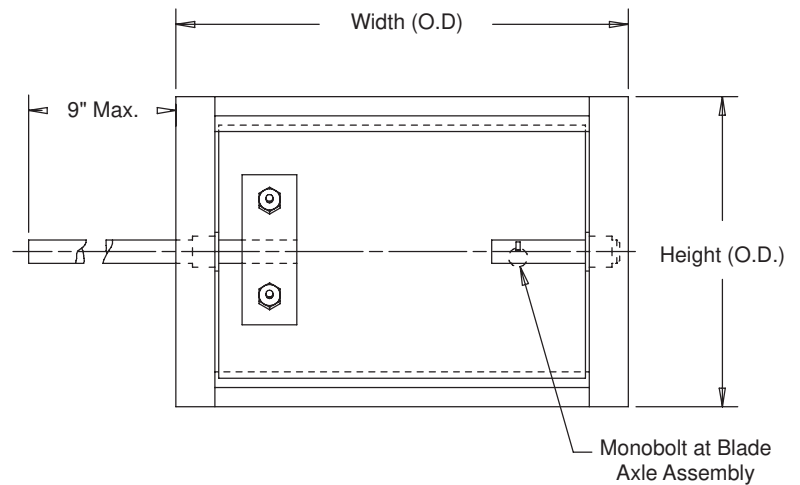


Section View



Extruded Aluminum Channel
Jams, Top and Bottom

Top View



Monobolt at Blade
Axle Assembly

MODEL 128

2" Deep • Single Thickness Blade • Aluminum Damper

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MODEL AC18/AC19

5" Deep • 4" Airfoil Blade • Aluminum Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 5" x .081" extruded aluminum, hat shaped

BLADES: 4" x .081" extruded aluminum, single unit airfoil design, with the pin-lock an integral section within the blade core

AXLES: 1/2" dia. extruded aluminum, pin-lock design interlocking into blade section

BEARINGS: Celcon

LINKAGE: Aluminum crank-arm permanently locked to have the blade shaft by 2 stainless steel fasteners; Crank-arm contains a 1/2" dia. cadmium plated and chromate treated machined steel trunnion riding in a celcon bearing; A plated steel 1/4-20 set screw with locking patch, ties the pivot to the 5/16" dia. aluminum linkage rod; The linkage of each damper is individually adjusted

SEALS: Extruded silicone rubber seal

FINISH: Mill

ACTUATOR: 6" extended shaft; dampers more than one panel wide or high and operated with one actuator must be jackshafted; Factory supplied actuators are shipped loose to be mounted external as standard

OPTIONS

Hand Quadrants

120V, 24V, or Pneumatic Actuators

Jackshafting

Auxiliary Switch

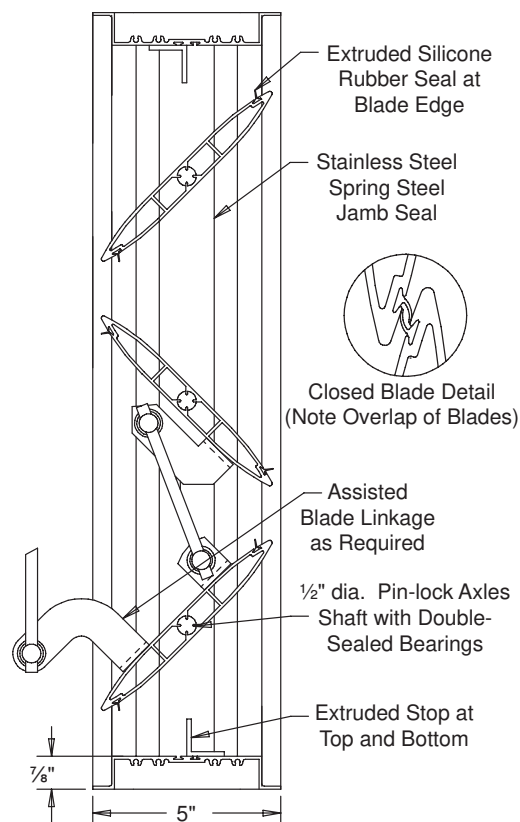
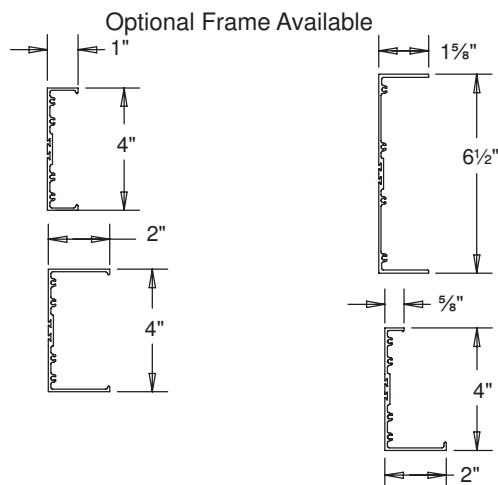
Explosion Proof Housing

NOTES

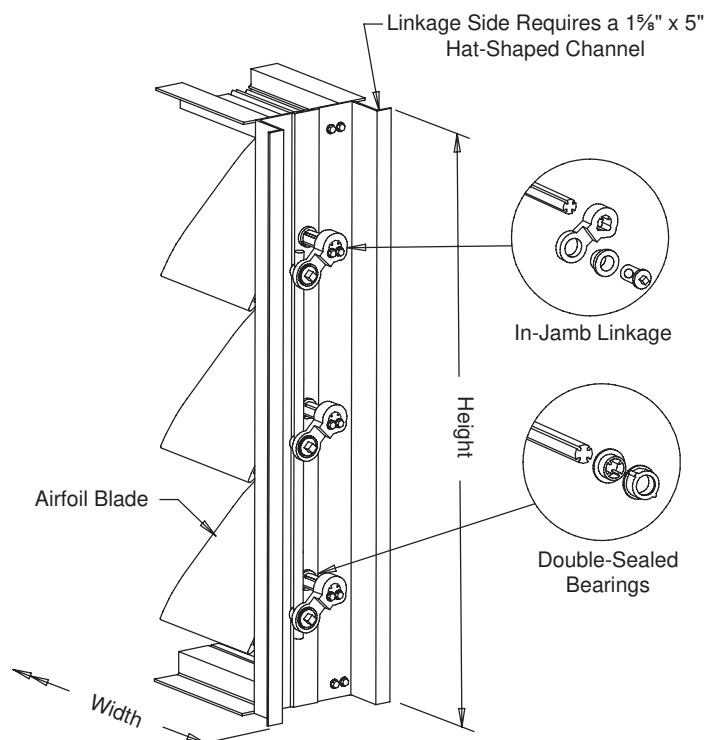
1. "A" width and "B" height are opening dimensions. Dampers are provided approximately 1/4" undersize.
2. Dampers with multiple panels in both width and height may require structural support. It is recommended that large openings be designed with structural members so that dampers will span either width or height with a single panel. ABI does not supply structural support with standard dampers.
3. Not recommended for blades installed vertically.
4. Approximate damper weight is 5.5 lbs./sq.ft.

DAMPER SIZE

Panels	Minimum Panel	Maximum Panel
AC18	12"W x 12"H	60"W x 72"H
AC19	12"W x 14 5/8"H	60"W x 72"H



AC19 (Opposed Blade)



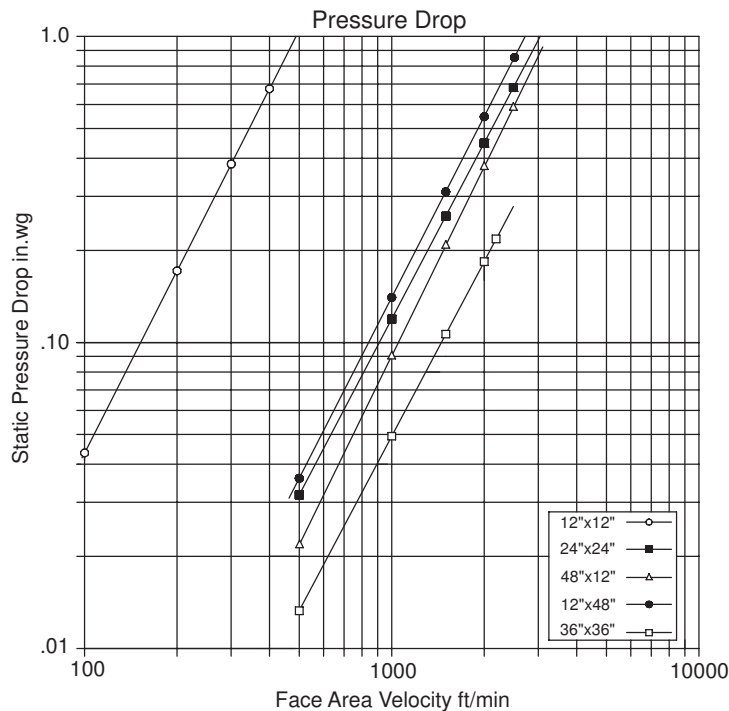
AC18 (Parallel Blade)

MODEL AC18/AC19

5" Deep • 4" Airfoil Blade • Aluminum Damper

Pressure Drop:

Pressure Drop Ratings are based on AMCA Standard 500 using test set-up Fig. 5.3 for damper installed with duct upstream and downstream. Static pressures are corrected to .075 lb./cu.ft. air density.



Leakage

Air Leakage requirements meet international energy conservation code (IECC) by leaking less than 3 cfm/sq.ft. at 1 in.wg and is AMCA licensed as a Class 1A Damper

Damper Size	1 in.wg Class	4 in.wg Class
12"W x 12"H	1A	1
24"W x 24"H	1A	1
36"W x 36"H	1A	1
12"W x 48"H	1A	1
48"W x 12"H	1A	1
60"W x 36"H	1A	1

Leakage Ratings are based on AMCA Standard 500 using test set-up Fig. 5.5 at an operation temperature range between 50°F & 104°F. Data is based on a seating torque of 40 lb/in for dampers less than 4 sq.ft in size. Dampers above 4 sq.ft., 5 lb/in/sq.ft is applied to hold the damper in the closed position.

12"W x 12"H

Face Area Velocity ft/min	Pressure Drop in.wg	Face Area Velocity ft/min	Pressure Drop in.wg
100	0.04	500	0.03
200	0.16	1000	0.12
300	0.38	1500	0.25
400	0.69	2000	0.45
500	1.00	2500	0.68

24"W x 24"H

12"W x 48"H

Face Area Velocity ft/min	Pressure Drop in.wg	Face Area Velocity ft/min	Pressure Drop in.wg
500	0.04	500	.02
1000	0.14	1000	.09
1500	0.31	1500	.20
2000	0.56	2000	.38
2500	0.85	2500	.58

48"W x 12"H

36"W x 36"H

Face Area Velocity ft/min	Pressure Drop in.wg
500	0.01
1000	0.05
1500	0.10
2000	0.18
2500	0.21

Damper Air Leakage Classification

		Leakage cfm/ft ²	
		Required Rating	
Class	Pressure	1 in.wg	4 in.wg
1A		3	na
1		4	8
2		10	20
3		40	80

MODEL AC18/AC19

5" Deep • 4" Airfoil Blade • Aluminum Damper

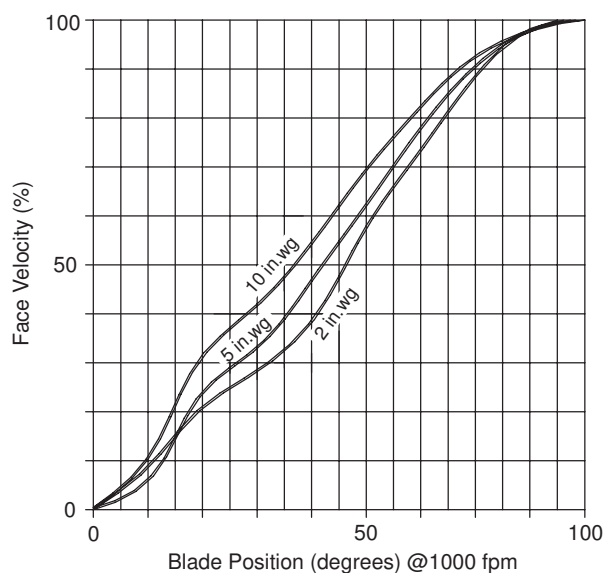
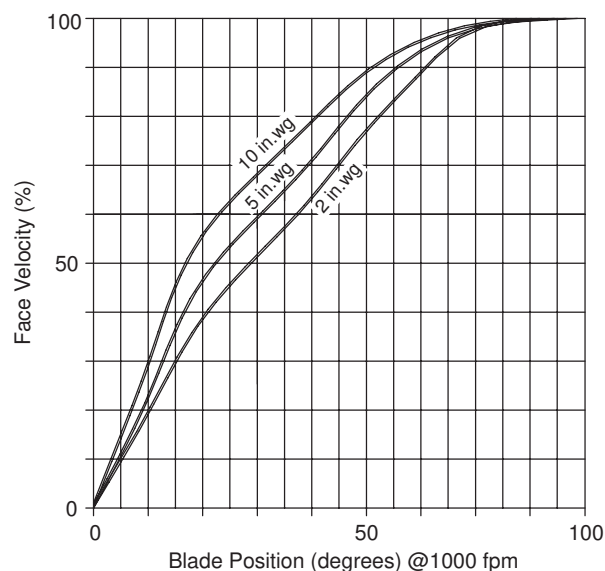
Linear Air Flow Characteristics

ABI has tested a variety of airfoil blade widths 4", 5", and 6" in various arrangements from all parallel, all opposed, and combinations of parallel and opposed blades in a common frame for a single damper installed in a duct.

Test units were installed in ductwork with duct upstream and downstream per AMCA test set-up Fig. 5.3. Using most common approach velocities and fan static.

The results of the tests show that fan static pressure does have an effect on the linear air flow characteristics of a damper. Graphs below will identify the simulated system conditions used for the single damper in duct system application

Curves shown in the graphs below show that model AC526 all opposed "as standardly built" is a very effective control damper for use in a variety of velocities and pressures.



MODEL AC18/AC19

5" Deep • 4" Airfoil Blade • Aluminum Damper

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MODEL AC525/AC526

5" Deep • 6" Airfoil Blade • Aluminum Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 5" x .081" extruded aluminum, hat shaped

BLADES: 6" x .081" extruded aluminum, single unit airfoil design, with the pin-lock an integral section within the blade core

AXLES: 1/2" dia. extruded aluminum, pin-lock design interlocking into blade section

BEARINGS: Celcon

LINKAGE: Aluminum crank-arm permanently locked to have the blade shaft by 2 stainless steel fasteners; Crank-arm contains a 1/2" dia. cadmium plated and chromate treated machined steel trunnion riding in a celcon bearing; A plated steel 1/4-20 set screw with locking patch, ties the pivot to the 5/16" dia. aluminum linkage rod; The linkage of each damper is individually adjusted

SEALS: Extruded silicone rubber seal

FINISH: Mill

ACTUATOR: 6" extended shaft; dampers more than one panel wide or high and operated with one actuator must be jackshafted; Factory supplied actuators are shipped loose to be mounted external as standard

OPTIONS

Hand Quadrants

120V, 24V, or Pneumatic Actuators

Jackshafting

Auxiliary Switch

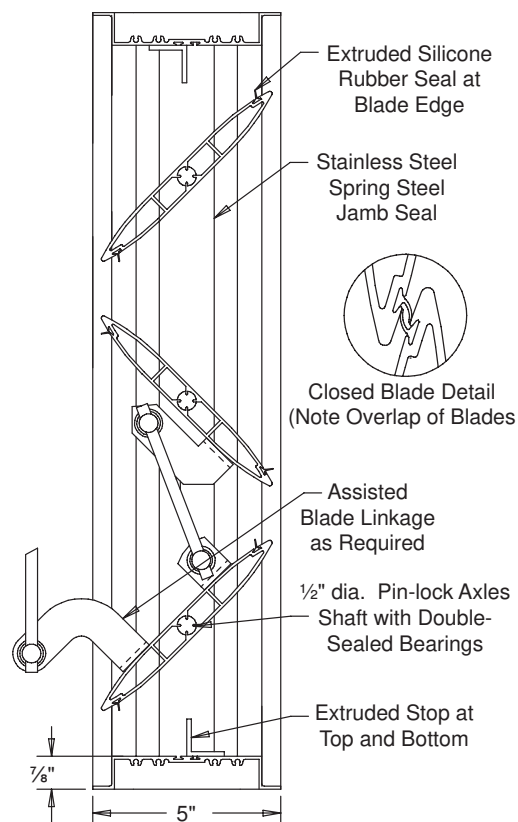
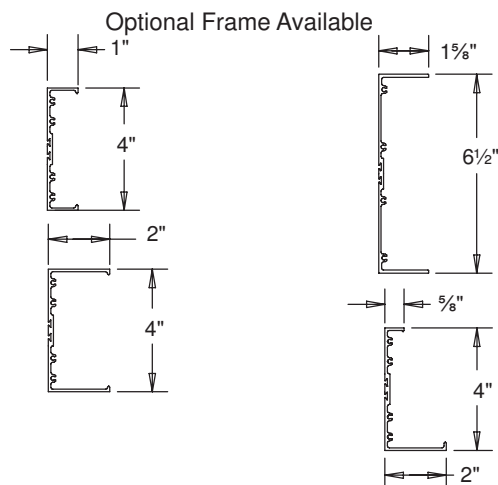
Explosion Proof Housing

NOTES

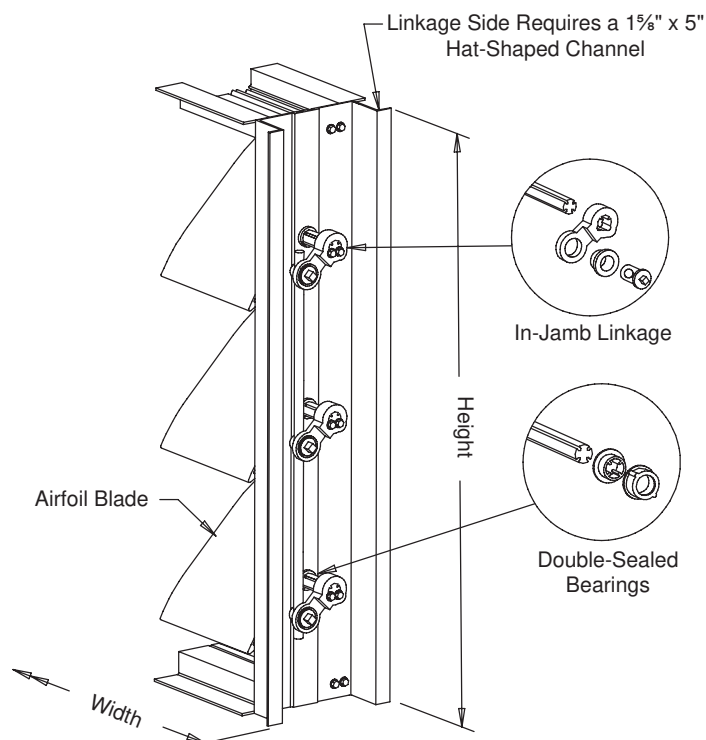
1. "A" width and "B" height are opening dimensions. Dampers are provided approximately 1/4" undersize.
2. Dampers with multiple panels in both width and height may require structural support. It is recommended that large openings be designed with structural members so that dampers will span either width or height with a single panel. ABI does not supply structural support with standard dampers.
3. Not recommended for blades installed vertically.
4. Approximate damper weight is 5.5 lbs./sq.ft.

DAMPER SIZE

Panels	Minimum Panel	Maximum Panel
AC525	12"W x 12"H	60"W x 72"H
AC526	12"W x 14 5/8"H	60"W x 72"H



AC526 (Opposed Blade)



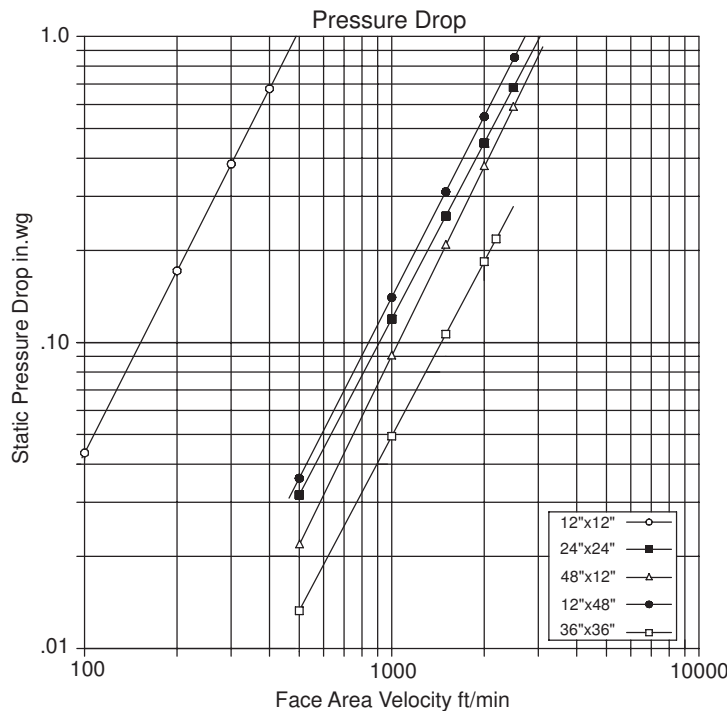
AC525 (Parallel Blade)

MODEL AC525/AC526

5" Deep • 6" Airfoil Blade • Aluminum Damper

Pressure Drop:

Pressure Drop Ratings are based on AMCA Standard 500 using test set-up Fig. 5.3 for damper installed with duct upstream and downstream. Static pressures are corrected to .075 lb./cu.ft. air density.



12"W x 12"H		24"W x 24"H	
Face Area Velocity ft/min	Pressure Drop in.wg	Face Area Velocity ft/min	Pressure Drop in.wg
100	0.04	500	0.03
200	0.16	1000	0.12
300	0.38	1500	0.25
400	0.69	2000	0.45
500	1.00	2500	0.68

12"W x 48"H		48"W x 12"H	
Face Area Velocity ft/min	Pressure Drop in.wg	Face Area Velocity ft/min	Pressure Drop in.wg
500	0.04	500	.02
1000	0.14	1000	.09
1500	0.31	1500	.20
2000	0.56	2000	.38
2500	0.85	2500	.58

36"W x 36"H	
Face Area Velocity ft/min	Pressure Drop in.wg
500	0.01
1000	0.05
1500	0.10
2000	0.18
2500	0.21

Leakage

Air Leakage requirements meet international energy conservation code (IECC) by leaking less than 3 cfm/sq.ft. at 1 in.wg and is AMCA licensed as a Class 1A Damper

Damper Size	1 in.wg Class	4 in.wg Class
12"W x 12"H	1A	1
24"W x 24"H	1A	1
36"W x 36"H	1A	1
12"W x 48"H	1A	1
48"W x 12"H	1A	1
60"W x 36"H	1A	1

Leakage Ratings are based on AMCA Standard 500 using test set-up Fig. 5.5 at an operation temperature range between 50°F & 104°F. Data is based on a seating torque of 40 lb/in for dampers less than 4 sq.ft in size. Dampers above 4 sq.ft., 5 lb/in/sq.ft is applied to hold the damper in the closed position.

Damper Air Leakage Classification

		Leakage cfm/ft²	
		Required Rating	
Class	Pressure	1 in.wg	4 in.wg
1A		3	na
1		4	8
2		10	20
3		40	80



ABI certifies that the model AC525-526 damper shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings program. The AMCA Certified Rating Seal applies to Air Performance/Air Leakage only.

MODEL AC525/AC526

5" Deep • 6" Airfoil Blade • Aluminum Damper

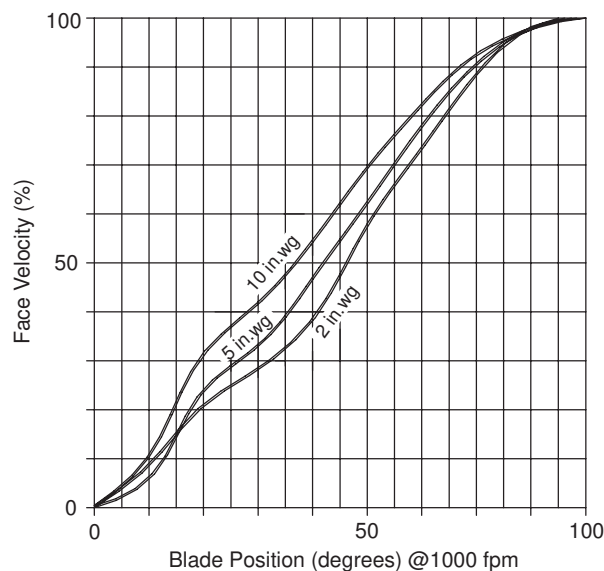
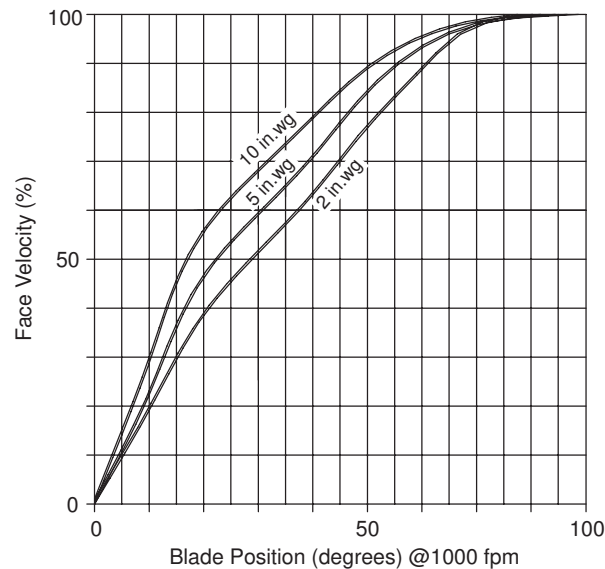
Linear Air Flow Characteristics

ABI has tested a variety of airfoil blade widths 4", 5", and 6" in various arrangements from all parallel, all opposed, and combinations of parallel and opposed blades in a common frame for a single damper installed in a duct.

Test units were installed in ductwork with duct upstream and downstream per AMCA test set-up Fig. 5.3. Using most common approach velocities and fan static.

The results of the tests show that fan static pressure does have an effect on the linear air flow characteristics of a damper. Graphs below will identify the simulated system conditions used for the single damper in duct system application

Curves shown in the graphs below show that model AC526 all opposed "as standardly built" is a very effective control damper for use in a variety of velocities and pressures.



MODEL AC525/AC526

5" Deep • 6" Airfoil Blade • Aluminum Damper

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MODEL AC51/AC52

5" Deep • Airfoil Blade • Blade Linkage • Extruded Aluminum Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick nominal; 12-GA extruded aluminum hat shaped channel with reinforcing bosses and grove inserts for silicone seals

BLADES: .081" thick nominal; 12-GA extruded aluminum to be a single unit airfoil design

AXLES: Pivot rods to be 1/2" dia. extruded aluminum, Pin-Lock design interlocking into blade section

BEARINGS: Double-sealed with celcon inner bearing riding inside a polycarbonate outer bearing positively locked into frame, designed so that there shall be no metal-metal or metal-to-bearing riding surfaces

LINKAGE: Non-corrosive reinforced material or cadmium plated steel

SEALS: Extruded silicone seals fit into dovetail shaped slots on both frames and blades.

FINISH: Mill

TEMP. LIMITS: -70° to 200°F

OPTIONS

Hand Quadrants

120V, 24V, or Pneumatic Actuators

Jackshafting

Auxillary Switch

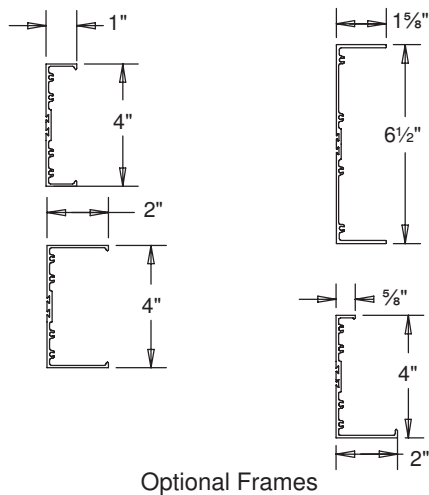
Explosion Proof Housing

NOTES

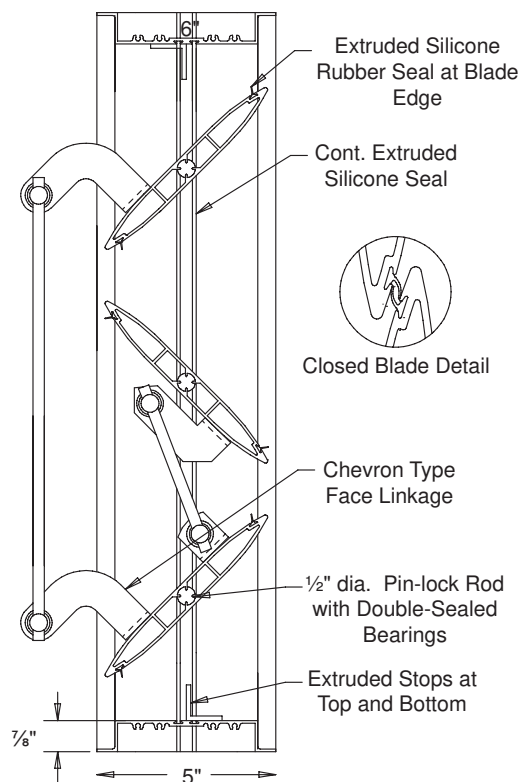
1. "A" width and "B" height are opening dimensions. Dampers are provided approximately 1/4" undersize.
2. Dampers with multiple panels in both width and height may require structural support. It is recommended that large openings be designed with structural members so that dampers will span either width or height with a single panel. ABI does not supply structural support with standard dampers.
3. Dampers more than one panel wide or high and operated with one actuator must be jackshafted. Factory supplied actuators are shipped loose to be mounted external as standard.
4. Not recommended for blades installed vertically.
5. Approximate damper weight is 6.5 lbs./sq.ft.

DAMPER SIZE

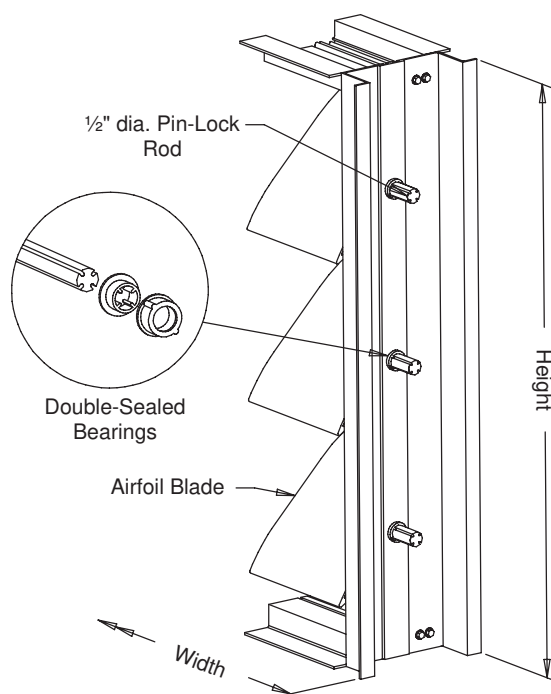
Panels	Minimum Panel	Maximum Panel
AC51	8"W x 10 7/8"H	60"W x 96"H
AC52	8"W x 14"	60"W x 96"H



Optional Frames



AC52 (Opposed Blade)



AC51 (Parallel Blade)

MODEL AC51/AC52

5" Deep • Airfoil Blade • Jamb Linkage • Extruded Aluminum Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick nominal; 12-GA extruded aluminum hat shaped channel with reinforcing bosses and groove inserts for silicone seals

BLADES: .081" thick nominal; 12-GA extruded aluminum to be a single unit airfoil design

AXLES: Pivot rods to be 1/2" dia. extruded aluminum, Pin-Lock design interlocking into blade section

BEARINGS: Double-sealed with celcon inner bearing riding inside a polycarbonate outer bearing positively locked into frame, designed so that there shall be no metal-metal or metal-to-bearing riding surfaces

LINKAGE: Non-corrosive reinforced material or cadmium plated steel

SEALS: Extruded silicone seals fit into dovetail shaped slots on both frames and blades.

FINISH: Mill

TEMP. LIMITS: -70° to 200°F

OPTIONS

Hand Quadrants

120V, 24V, or Pneumatic Actuators

Jackshafting

Auxiliary Switch

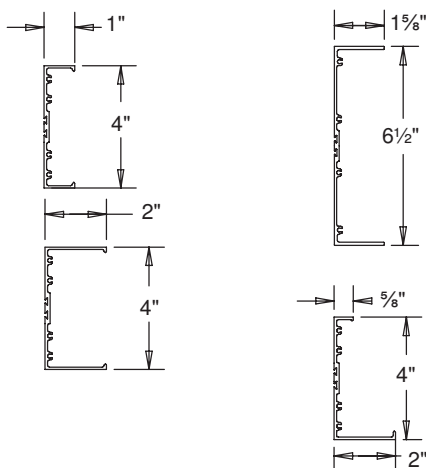
Explosion Proof Housing

NOTES

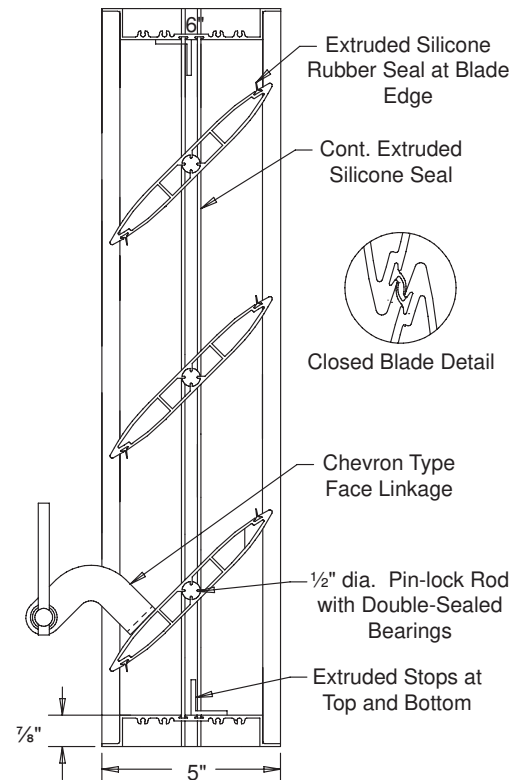
1. "A" width and "B" height are opening dimensions. Dampers are provided approximately 1/4" undersize.
2. Dampers with multiple panels in both width and height may require structural support. It is recommended that large openings be designed with structural members so that dampers will span either width or height with a single panel. ABI does not supply structural support with standard dampers.
3. Dampers more than one panel wide or high and operated with one actuator must be jackshafted. Factory supplied actuators are shipped loose to be mounted external as standard.
4. Not recommended for blades installed vertically.
5. Approximate damper weight is 6.5 lbs./sq.ft.

DAMPER SIZE

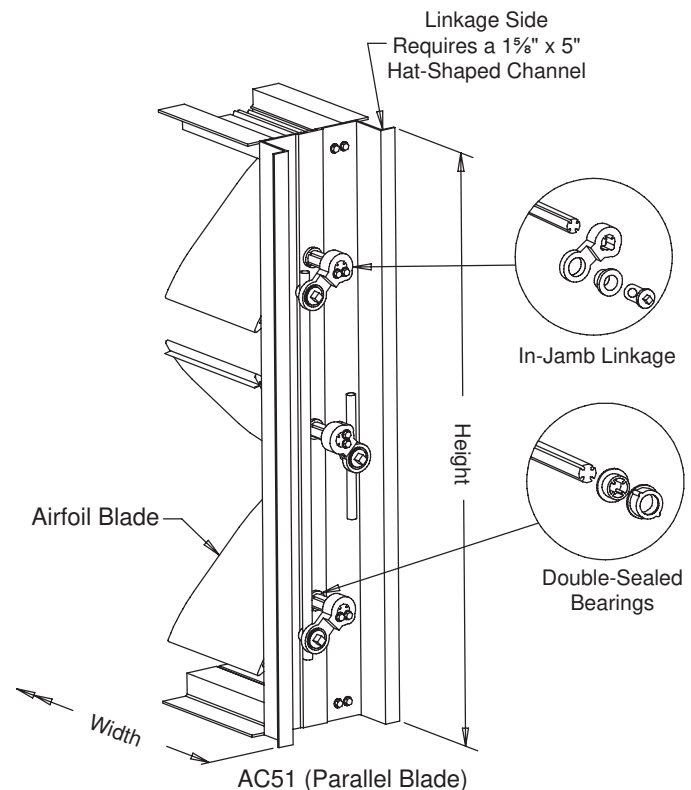
Panels	Minimum Panel	Maximum Panel
AC51	6"W x 6 1/4"H	60"W x 96"H
AC52	6"W x 12"	60"W x 96"H



Optional Frames



AC52 (Opposed Blade)



MODEL AC53/AC54

5" Deep • 6" Single Thickness Blade • Aluminum Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5" x .081" extruded aluminum, hat shaped channel with reinforcing bosses and groove inserts for silicone seals
- BLADES:** 6" x .125" extruded aluminum, single unit pin-lock design, with the pin-lock at integral section within the blade core
- AXLES:** 1/2" dia. extruded aluminum, pin-lock design interlocking into blade section
- BEARINGS:** Double-Sealed type with celcon inner bearing on rod riding in polycarbonate outer bearing inserted in frame so that outer bearing cannot rotate
- LINKAGE:** Non-Corrosive reinforced metal or plated steel
- SEALS:** Extruded silicone seals fit into dovetail shaped slots on both frames and blades
- FINISH:** Mill

OPTIONS

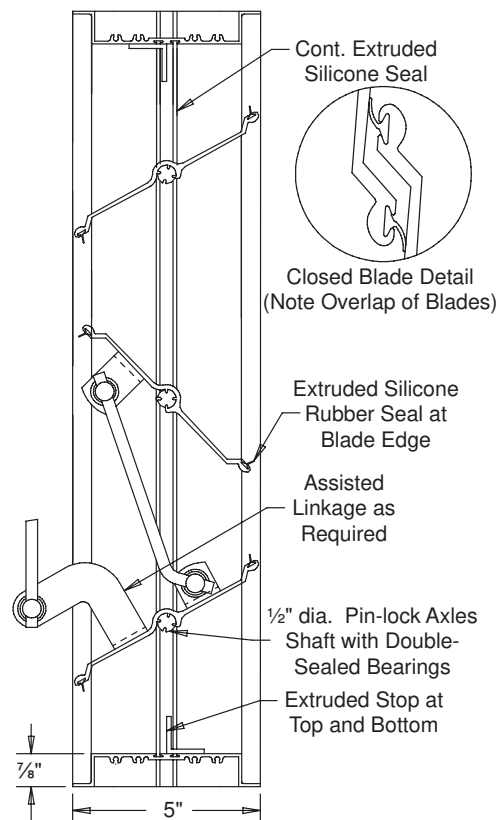
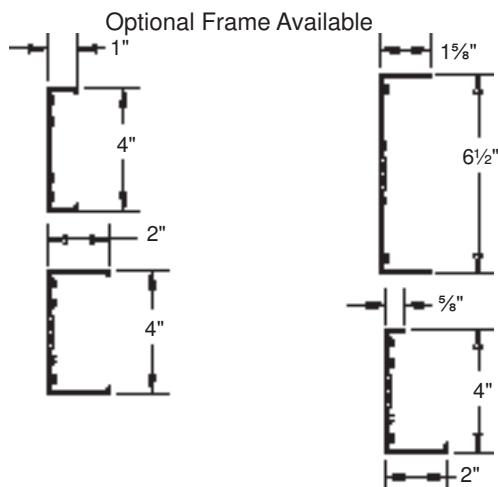
Hand Quadrants
120V, 24V, or Pneumatic Actuators
Jackshafting
Auxiliary Switch
Explosion Proof Housing

NOTES

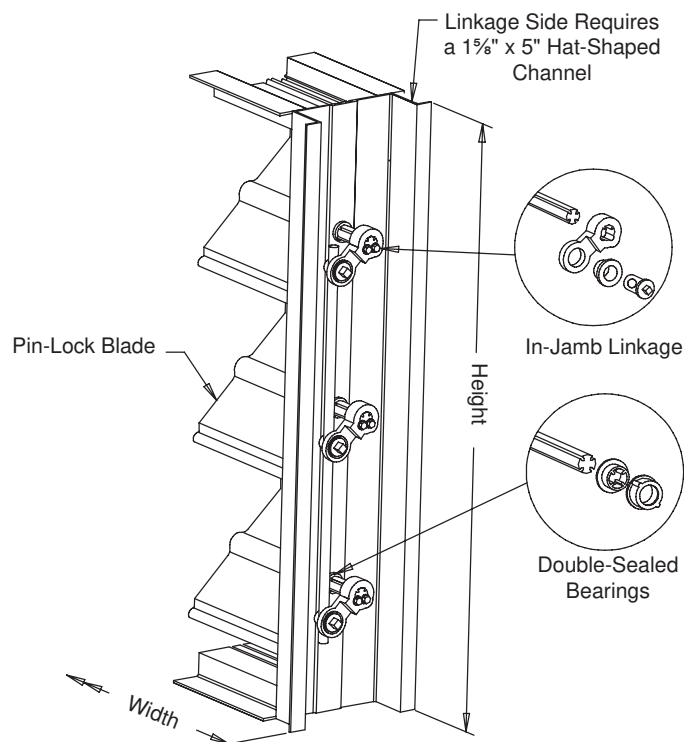
1. "A" width and "B" height are opening dimensions. Dampers are provided approximately 1/4" undersize.
2. Dampers with multiple panels in both width and height may require structural support. It is recommended that large openings be designed with structural members so that dampers will span either width or height with a single panel. ABI does not supply structural support with standard dampers.
3. Dampers more than one panel wide or high and operated with one actuator must be jackshafted. Factory supplied actuators are shipped loose to be mounted external as standard.
4. Not recommended for blades installed vertically.
5. Approximate damper weight is 6.5 lbs./sq.ft.

DAMPER SIZE

Panels	Minimum Panel	Maximum Panel
AC53	12"W x 12"H	60"W x 72"H
AC54	12"W x 14 5/8"H	60"W x 72"H



AC53 (Opposed Blade)



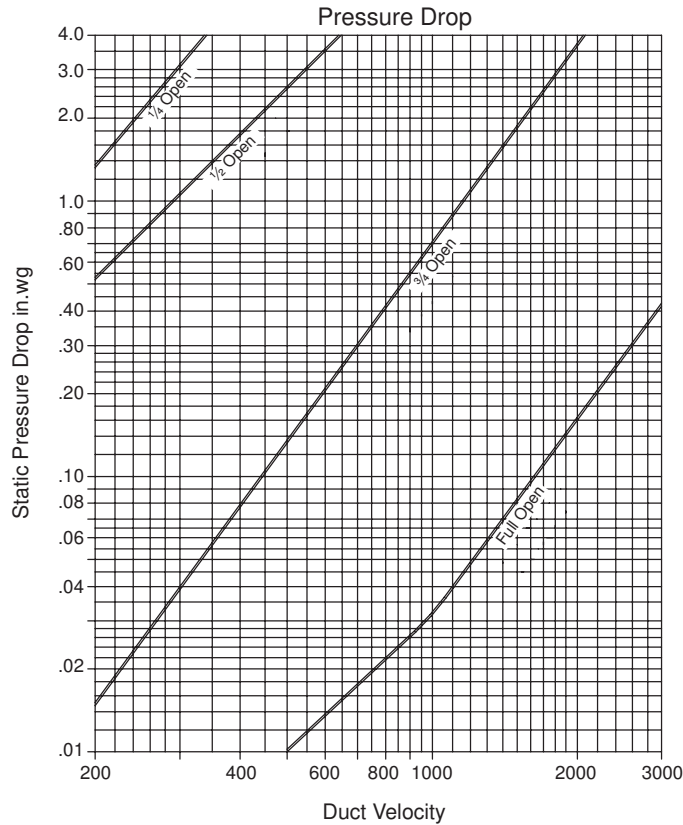
AC52 (Parallel Blade)

MODEL AC53/AC54

5" Deep • 6" Single Thickness Blade • Aluminum Damper

Performance Data:

Pressure Drop Ratings are based on AMCA Standard 500 using test set-up Fig. 5.3 for damper installed with duct upstream and downstream. Static pressures are corrected to .075 lb./cu.ft. air density.



Air leakage ratings are based on AMCA Standard 500 using test set-up 5.4 the test results indicate exceptional low leakage. Damper leakage performance meets specifications requiring less than 1/2% of 1% for damper range of sizes.

Maximum Damper Width	Maximum System Static Pressure	Maximum System Velocity	Air Leakage
48"	2 in.wg	2000 fpm	7.5 cfm/sq.ft
36"	2.5 in.wg	2500 fpm	10.5 cfm/sq.ft
24"	2.5 in.wg	2500 fpm	10.5 cfm/sq.ft
12"	4.0 in.wg	3000 fpm	13.2 cfm/sq.ft

MODEL TB58

5" Deep • Airfoil Blade • Thermal Break Aluminum Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 5" x .081" thick nominal 6063-T6/T52 extruded aluminum, hat shaped

BLADES: 6" x .080" thick nominal; 6063-T6/T52 extruded aluminum, airfoil profile injected with a two part polyurethane (cfc) free foam, and debridged for thermal isolation

AXLES: 1/2" dia. extruded aluminum, pin-lock design, interlocking into blade section

BEARINGS: Double-sealed with celcon inner bearing riding inside a polycarbonate outer bearing positively locked into frame, designed so that there shall be no metal-metal or metal-to-bearing riding surfaces

LINKAGE: Concealed in jamb of heavy aluminum; Crank arm permanently locked to blade axle by two stainless steel fasteners; The crank arm contains a 1/2" dia. metal pivot riding in a celcon bearing; A 1/4-20 set screw with locking patch ties the 5/16" dia. aluminum linkage rod; the linkage of each damper is individually adjusted

SEALS: Extreme low temperature seal system, extruded silicone rubber blade edge seal that fits into a ribbed groove insert in blades with an extruded polycarbonate seal at jamps

FINISH: Mill

TEMP. LIMITS: -40° to 200°

OPTIONS

Hand Quadrants

120V, 24V, or Pneumatic Actuators

Jackshafting

Auxillary Switch

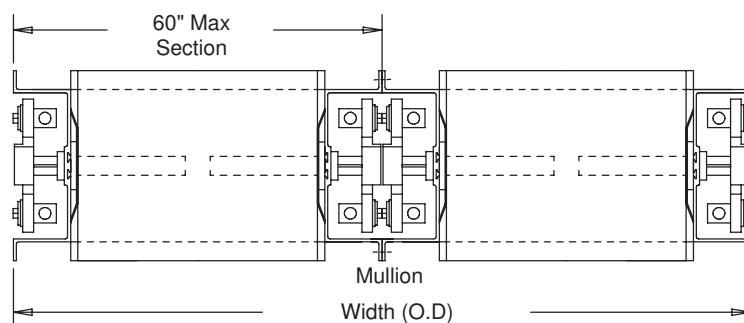
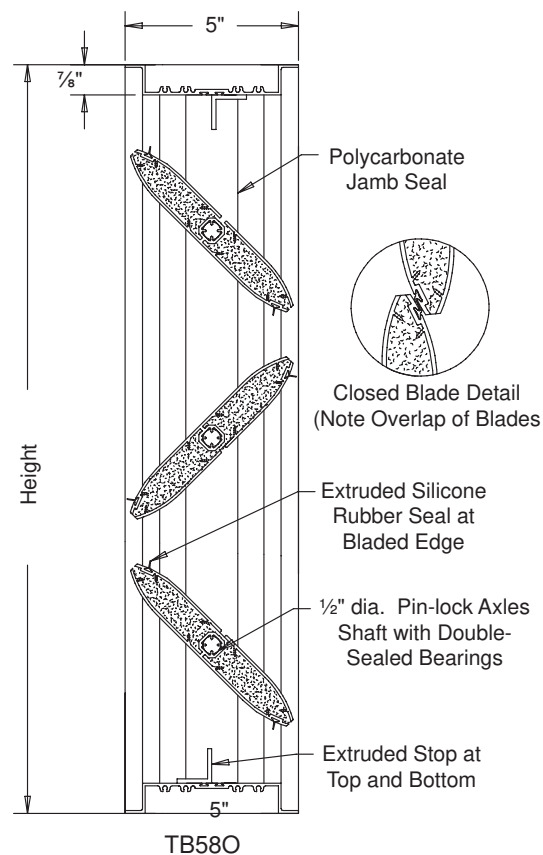
Explosion Proof Housing

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided approximately 1/4" undersize.
2. Dampers with multiple panels in both width and height may require structural support. It is recommended that large openings be designed with structural members so that dampers will span either width or height with a single panel. ABI does not supply structural support with standard dampers.
3. Dampers more than one panel wide or high and operated with one actuator must be jackshafted. Factory supplied actuators are shipped loose to be mounted external as standard.
4. Not recommended for blades installed vertically.
5. Approximate damper weight is 6.5 lbs./sq.ft.

DAMPER SIZE

Panels	Minimum Panel	Maximum Panel
TB58P	12"W x 8 7/8"H	60"W x 72"H
TB58O	12"W x 12"H	60"W x 72"H

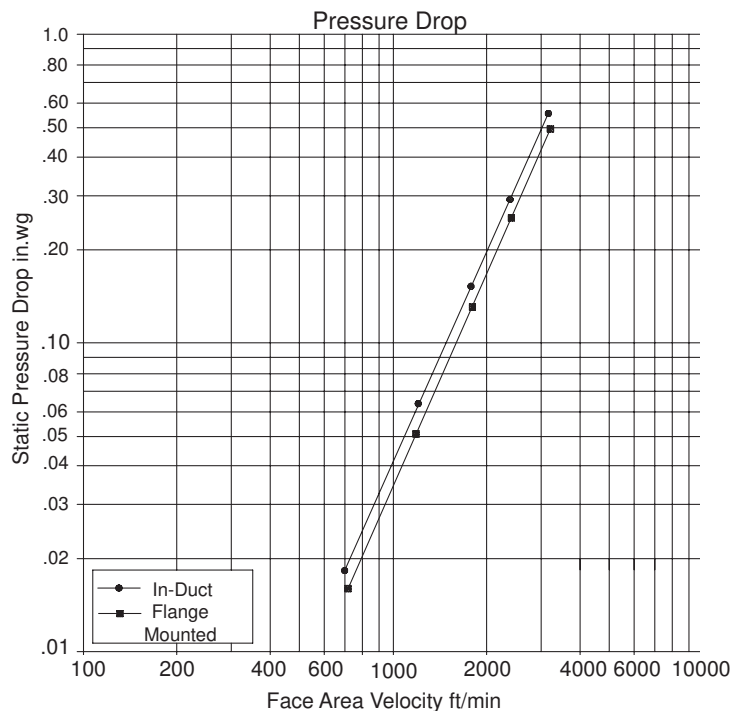


MODEL TB58

5" Deep • Airfoil Blade • Thermal Break Aluminum Damper

Pressure Drop:

Pressure Drop Ratings are based on AMCA Standard 500 using test set-up Fig. 5.3 for damper installed with duct upstream and downstream. Static pressures are corrected to .075 lb./cu.ft. air density.



Leakage

Total cfm Leakage at 1 in.wg Static Pressure Differential

		Width				
		12"	24"	36"	48"	60"
Height	12"	2	4	6	8	10
	18"	3	6	9	12	15
	24"	4	8	12	16	20
	30"	5	10	15	20	25
	36"	6	12	18	24	30
	42"	7	14	21	28	35
	48"	8	16	24	32	40
	54"	9	18	27	36	45
	60"	10	20	30	40	50
	66"	11	22	33	44	5
72"	12	24	36	48	60	

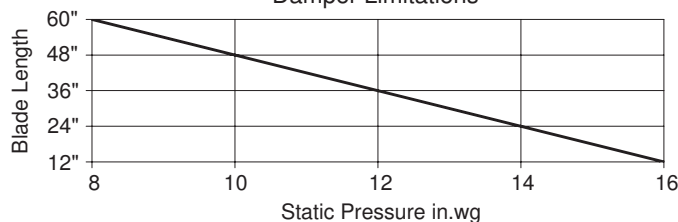
Leakage Ratings are based on AMCA Standard 500-D-97 using test set-up Fig. 5.4. Data is based on a closing torque of 5 in.lb./sq.ft. for dampers less than 5 sq.ft. having a closing torque of 40 in.lb. damper closing torque is applied to damper operating shaft.

Leakage Correction Factor

Damper Width	Static Pressure in.wg						
	2"	3"	4"	5"	6"	7"	8"
12" - 60"	1.44	1.64	2.00	2.22	2.44	2.64	2.82

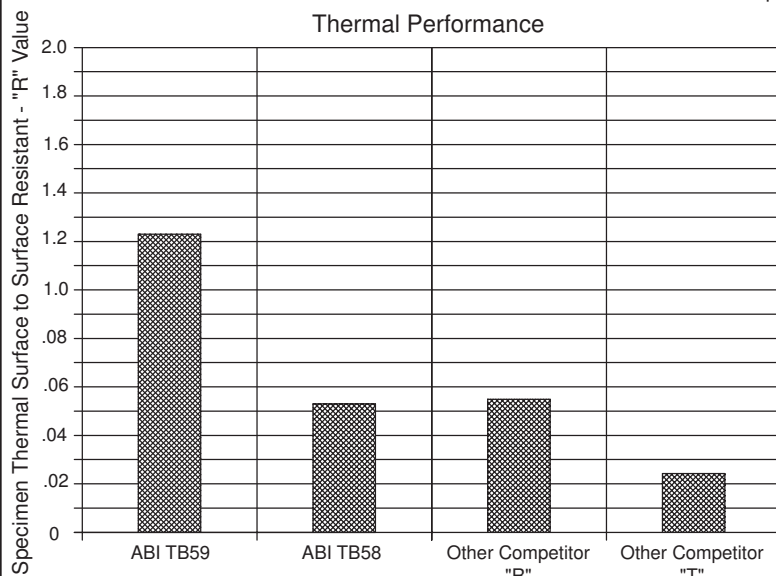
Use of correction factors will give leakage values at greater than 1" pressures.

Damper Limitations



Model TB58 damper design at reduced lengths can withstand higher static pressure limits without sacrificing damper operation and performance. Static pressures above 8 in.wg will affect operation torque value.

Thermal Performance



Damper Limitations

Damper Assembly Thermal Performance Rating Tested to ASTM C-1363-97, Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus and Replaces C236 and C-975 Test Methods.

MODEL TB59

5" Deep • Airfoil Blade • Thermal Break Frame and Blade Aluminum Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 6"W x 1 $\frac{1}{8}$ "H x .125" thick nominal 6063-T6/T52 extruded aluminum, and 2 thermal breaks filled with polyurethane and debridged for thermal isolation
- BLADES:** 6" x .080" thick nominal; 6063-T6/T52 extruded aluminum, airfoil profile injected with a two part polyurethane (cfc) free foam, and debridged for thermal isolation
- AXLES:** 1/2" dia. extruded aluminum, pin-lock design, interlocking into blade section
- BEARINGS:** Double-sealed with celcon inner bearing riding inside a polycarbonate outer bearing positively locked into frame, designed so that there shall be no metal-metal or metal-to-bearing riding surfaces
- LINKAGE:** Concealed in jamb of heavy aluminum; Crank arm permanently locked to blade axle by two stainless steel fasteners; The crank arm contains a 1/2" dia. metal pivot riding in a celcon bearing; A 1/4-20 set screw with locking patch ties the 5/16" dia. aluminum linkage rod; the linkage of each damper is individually adjusted
- SEALS:** Extreme low temperature seal system, extruded silicone rubber blade edge seal that fits into a ribbed groove insert in blades with an extruded polycarbonate seal at jams
- FINISH:** Mill
- ACTUATOR:** 6" extended shaft; dampers more than one panel wide or high and operated with one actuator must be jackshafted; Factory supplied actuators are shipped loose to be mounted external as standard
- TEMP. LIMITS:** -70° to 200°F

OPTIONS

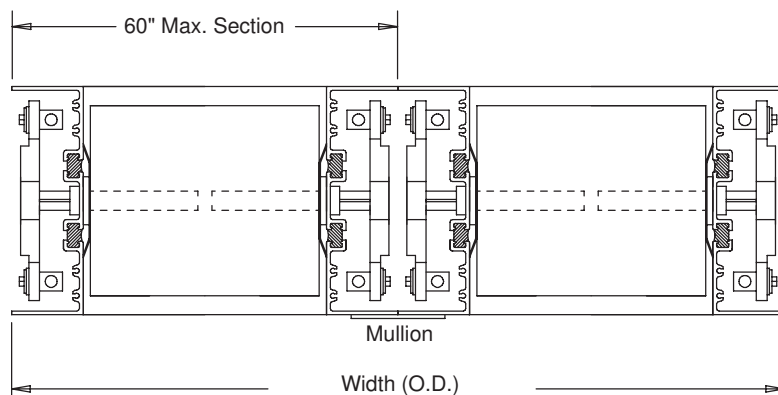
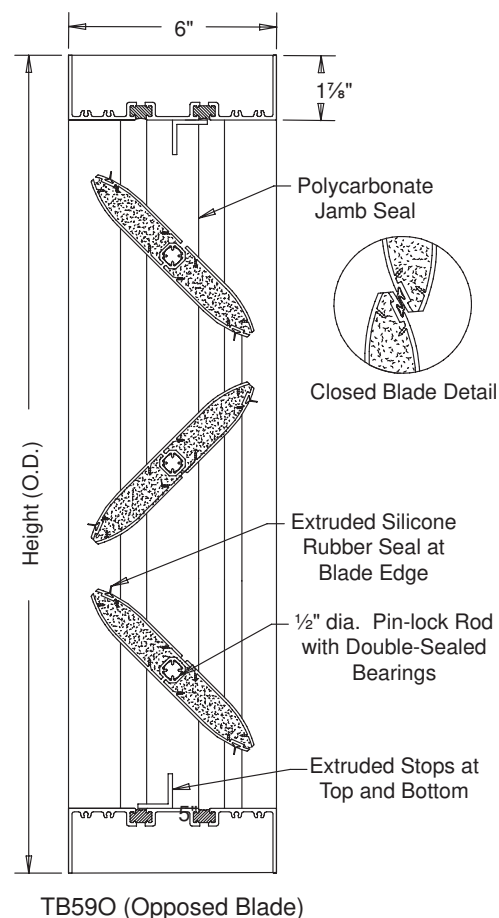
Hand Quadrants
120V, 24V, or Pneumatic Actuators
Jackshafting
Auxiliary Switch
Explosion Proof Housing
.125 Nominal Construction

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided approximately 1/4" undersize.
2. Dampers with multiple panels in both width and height may require structural support. It is recommended that large openings be designed with structural members so that dampers will span either width or height with a single panel. ABI does not supply structural support with standard dampers.
3. Not recommended for blades installed vertically.
4. Approximate damper weight is 6.5 lbs./sq.ft.

DAMPER SIZE

Panels	Minimum Panel	Maximum Panel
TB59P	8"W x 10 $\frac{1}{8}$ "H	60"W x 72"H
TB59O		

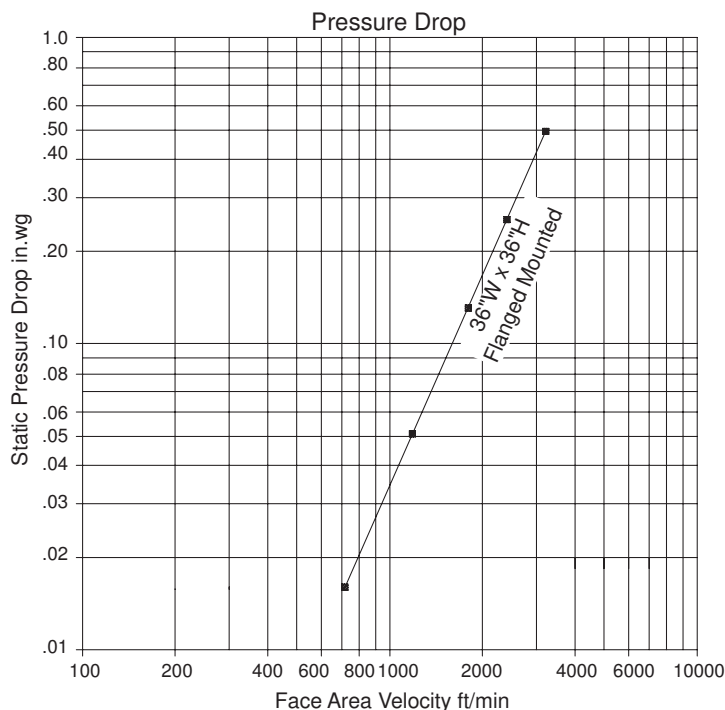


MODEL TB59

5" Deep • Airfoil Blade • Thermal Break Frame and Blade Aluminum Damper

Pressure Drop:

Pressure Drop Ratings are based on AMCA Standard 500-D-97 using test set-up Fig. 5.3 for damper installed with duct upstream and downstream. Static pressures are corrected to .075 lb./cu.ft. air density.



Leakage

Total cfm Leakage at 1 in.wg Static Pressure Differential

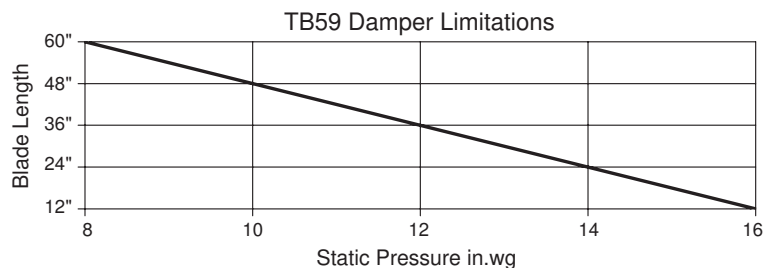
		Width				
Height		12"	24"	36"	48"	60"
	12"	2	4	6	8	10
	18"	3	6	9	12	15
	24"	4	8	12	16	20
	30"	5	10	15	20	25
	36"	6	12	18	24	30
	42"	7	14	21	28	35
	48"	8	16	24	32	40
	54"	9	18	27	36	45
	60"	10	20	30	40	50
	66"	11	22	33	44	55
	72"	12	24	36	48	60

Leakage Ratings are based on AMCA Standard 500-D-97 using test set-up Fig. 5.4. Data is based on a closing torque of 5 in-lb/sq.ft. for dampers less than 6 sq.ft having a closing torque of 40 in-lb. Damper closing torque is applied to damper operating shaft.

Leakage Correction Factor

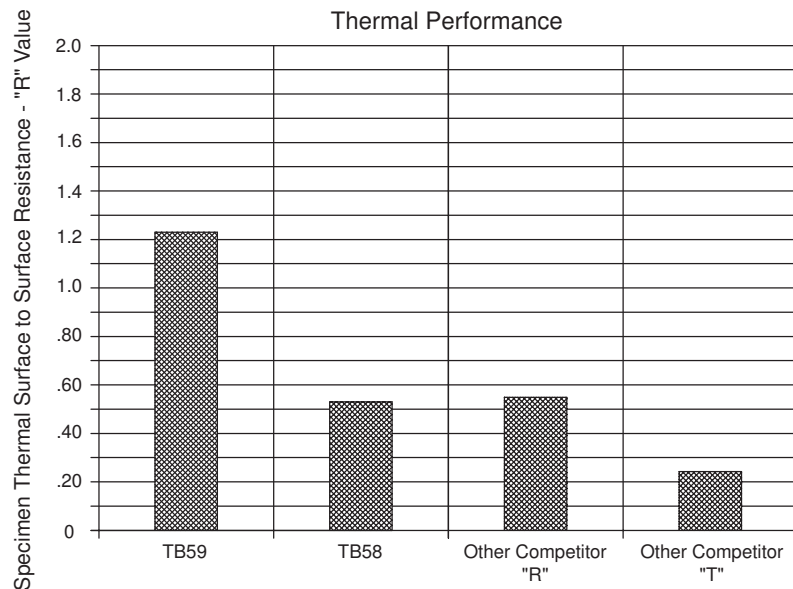
Damper Width 12" - 60"	Static Pressure in wg						
	2"	3"	4"	5"	6"	7"	8"
	1.44	1.64	2.00	2.22	2.44	2.54	2.82

Use of correction factors will give leakage values at greater than 1" pressures.



Model TB59 damper design at reduced lengths can withstand higher static pressure limits without sacrificing damper operation and performance. Static pressures above 8 in.wg will affect operation torque value.

Thermal Performance



Damper Assembly Thermal Performance Rating
Tested to ASTM C-1363-97, Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus and Replaces C-236 and C-976 Test Methods.



Backdraft Dampers

- BSL — Extruded Aluminum, All Purpose Shutter
- BS50 — Extruded Aluminum, Round
- BS51/52/53 — Galvanized Steel, Aluminum, or Stainless Steel, Round
- BS55 — Aluminum, Single Thickness Blade
- BS66 — Steel, Single Thickness Blade
- BID4 — Formed Steel, “Tear Drop” Design Blade
- BID9 — Formed Steel, “Tear Drop” Design Blade

air balance

Dampers  Louvers
UL Life Safety Products

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MODEL BSL

2" Deep • Single Thickness Blade • Aluminum Construction • Light Duty Backdraft Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .093" thick, $\frac{5}{8}$ " x 2" x $\frac{5}{8}$ " extruded aluminum channel
BLADE: .032" thick aluminum, formed over a $\frac{3}{16}$ " dia. steel rod
SEALS: Polyurethane foam at blade edges, none at jambs
BEARINGS: Bronze oilite
LINKAGE: Aluminum chevron bracket with aluminum linkage bar
FINISH: Mill

OPTIONS

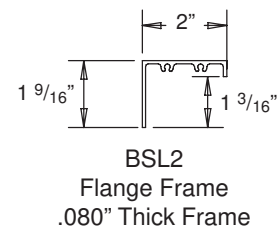
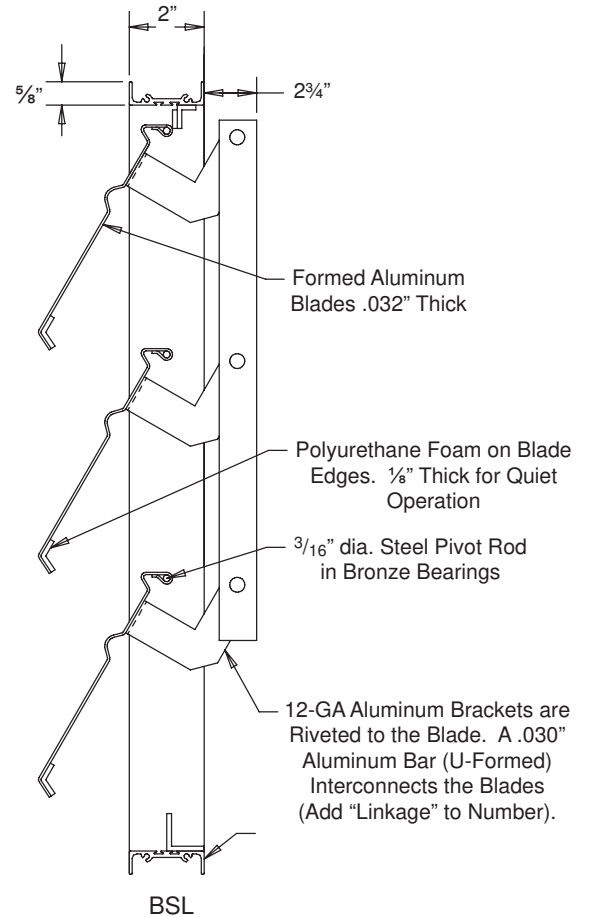
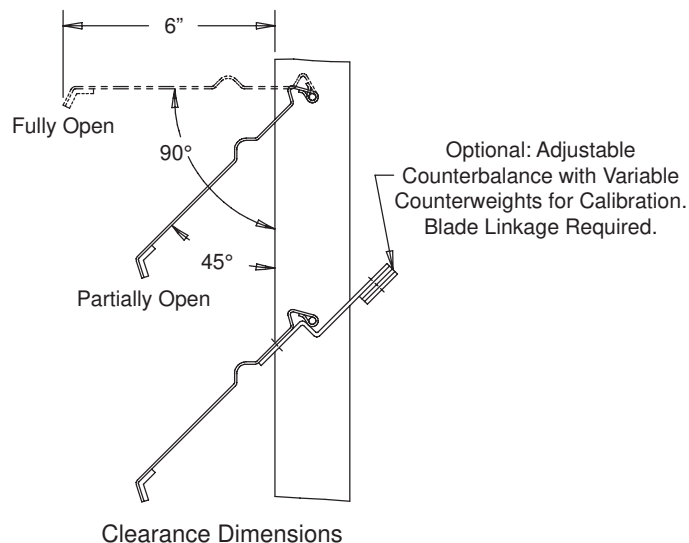
Flange Frame
 No Blade to Blade Linkage
 Adjustable Counterbalance
 (Specify to Assist or Resist Opening, Linkage Must be Used)

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided $\frac{1}{4}$ " undercut.
2. Specify air flow as horizontal, vertical up, or vertical down.

DAMPER SIZES

Panels	Min Panel	Max Single Panel
BSL	8"W x 8"H	48"W x 72"H



air balance

Dampers  Louvers
 UL Life Safety Products
 Division of Mestek
 Member of AMCA

MODEL BSL

2" Deep • Single Thickness Blade • Aluminum Construction • Light Duty Backdraft Damper

Velocity vs. Pressure Drop: Typical performance for model BSL backdraft damper size tested 42"W x 42"H, furnished with counterweight to assist opening.

Without Ductwork

Dampers installed per AMCA 500 Fig. 5.4

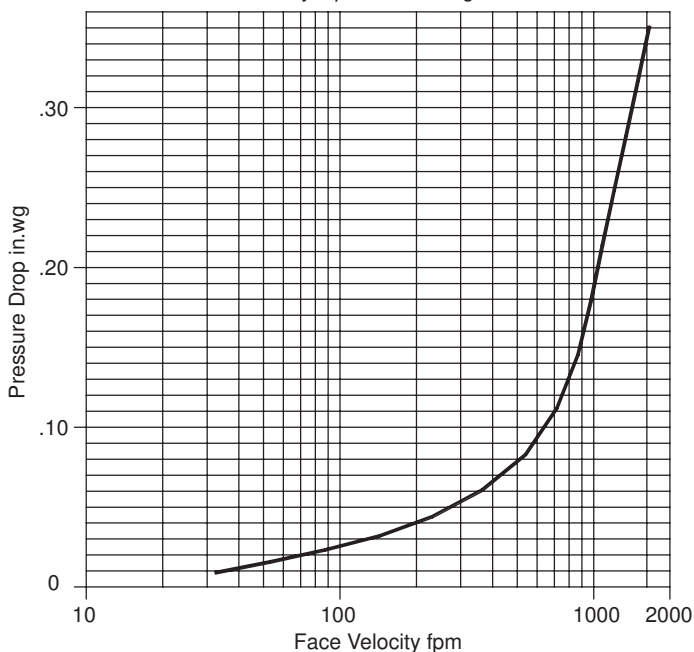
(Face Mounted to a Plenum)

Pressure is Corrected to .075 lb./cu.ft. Air Density

Operational Pressure

Start to Open - .01 in.wg

Fully Open - .35 in.wg



With Ductwork

Dampers installed per AMCA 500 Fig. 5.3

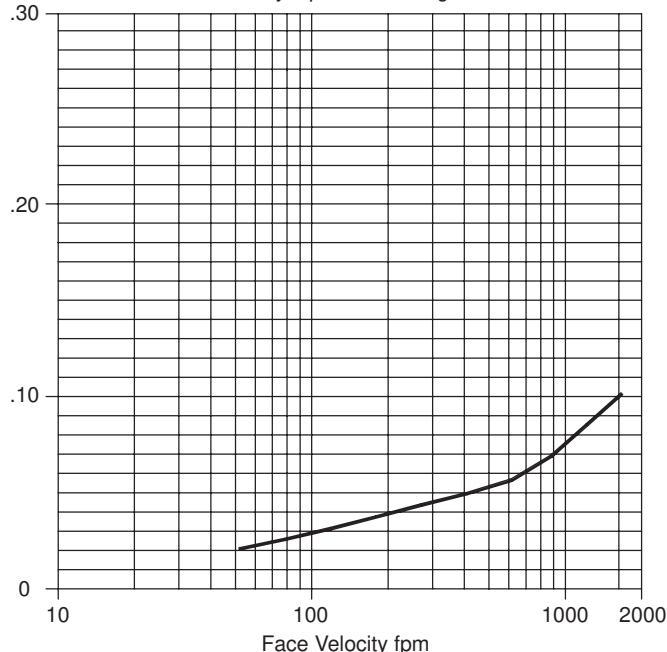
(Ductwork Installed Upstream and Downstream of Damper)

Pressure is Corrected to .075 lb./cu.ft. Air Density

Operational Pressure

Start to Open - .01 in.wg

Fully Open - .06 in.wg



Air Leakage: Air leakage quantities shown in the chart are results of tests per AMCA standard 500 and are shown at .1 in.wg differential pressure and corrected to .075 lbs/cu.ft. air density.

Total CFM Air Leakage at .10" Static Pressure Differential Through Closed Damper

		Width						
Height		12	18	24	30	36	42	48
	12	6.6	9.9	13.2	16.5	19.8	23.1	26.4
	24	13.2	19.8	26.4	33.0	39.6	46.2	52.8
	36	19.8	29.7	39.6	49.5	59.4	69.3	79.2
	48	26.4	39.6	52.8	66.0	79.2	92.4	105.6
	60	33.0	49.5	66.0	82.5	99.0	115.5	132.0
	72	39.6	59.4	79.2	99.0	118.8	138.6	158.4

For determining leakage values greater than .10 in.wg to a maximum 2 in.wg use the multiplier correction chart below.

Static Pressure	.2	.3	.4	.5	1.0	1.5	2.0
Multiplier Correction Factor	1.07	1.12	1.19	1.24	1.66	1.92	2.10

Air leakage ratings are based on AMCA Standard 500 using test set up Fig. 5.4 with damper in the closed position without the aid of a counterweight or other mechanical means to provide closing torque, for a size 42"W x 42"H damper with blade and jamb seals.

MODEL BS50

Aluminum Blades • 200°F Max. Temperature • Vertical or Horizontal Mount • Backdraft Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 20-GA galvanized rolled frame

BLADE: .35" aluminum blades

AXLE PINS: Zinc plated with push on retainer clips

STOP ANGLES: 20-GA galvanized

BLADE STIFFENER: 20-GA galvanized

SEALS: Self adhesive .125" x .375" foam

FINISH: Mill

NOTES

1. Damper frames are provided approximately $\frac{1}{4}$ " undersized.
2. Dampers are for vertical mount, horizontal air flow; horizontal mount, vertical up or down air flow.

DESIGN CRITERIA

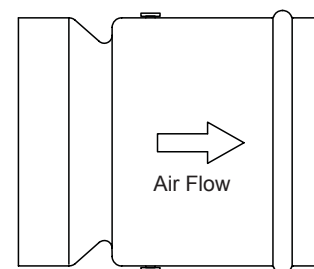
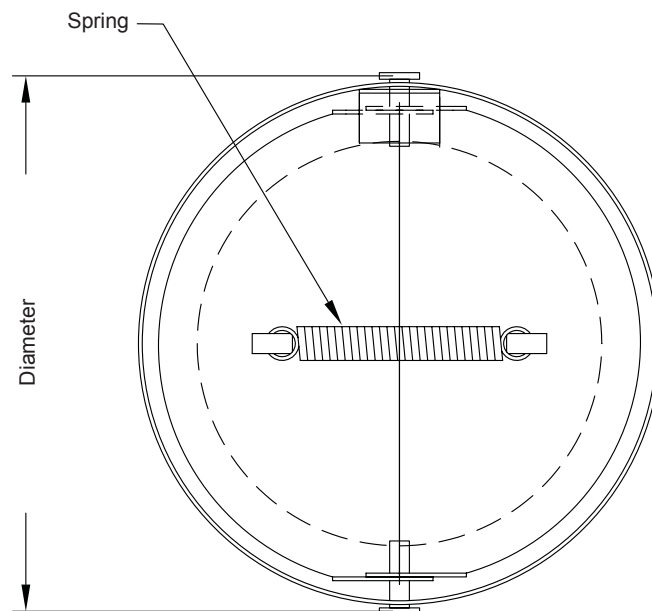
MAX VELOCITY: 1000 fpm

MAX DIFF PRESSURE: 1 in.wg

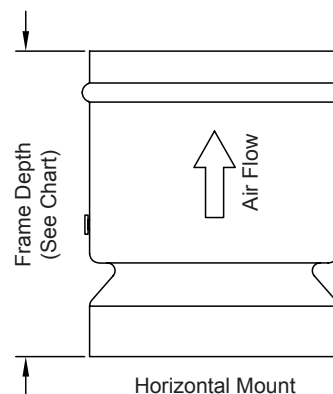
MAX TEMPERATURE: 200°F

DAMPER SIZES

Panels	Min Panel	Max Panel
Drop-In Frame	5" dia.	24" dia.
Size Chart		
Size	Actual Frame Diameter	Frame Depth
5"	4.87"	7.5"
6"	5.87"	7.5"
7"	6.87"	7.5"
8"	7.87"	7.5"
9"	8.87"	7.5"
10"	9.87"	7.5"
11"	10.87"	7.5"
12"	11.87"	10.5"
13"	12.87"	10.5"
14"	13.87"	10.5"
15"	14.87"	10.5"
16"	15.87"	10.5"
17"	16.87"	12.5"
18"	17.87"	12.5"
19"	18.87"	12.5"
20"	19.87"	12.5"
21"	20.87"	12.5"
22"	21.87"	12.5"
23"	22.87"	12.5"
24"	23.87"	12.5"



Vertical Mount



Horizontal Mount

air balance

Dampers  Louvers
UL Life Safety Products
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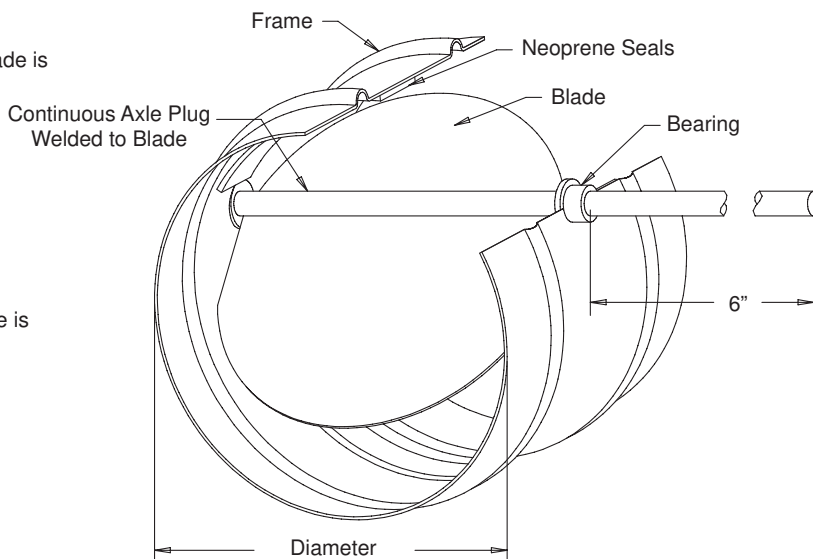
MODEL BS50

Aluminum Blades • 200°F Max. Temperature • Vertical or Horizontal Mount • Backdraft Damper

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MODEL BS51/BS52/BS53

7½" Deep • Round • Galvanized Steel, Aluminum, or Stainless Steel Backdraft Damper

STANDARD MATERIALS AND CONSTRUCTION**BS51 - Galvanized Steel****FRAME:** 16-GA galvanized steel, 7½" deep**BLADE:** 16-GA galvanized steel, dampers > 18" dia. blade is reinforced**AXLE:** Continuous ½" dia. cadmium plated steel**BEARINGS:** Flange bronze oilite**SEALS:** On frame, closed cell neoprene, ¼" thick;
Temperature Range -35°F to 180°F**FINISH:** Mill**BS52 - Aluminum****FRAME:** .080" thick aluminum, 7½" deep**BLADE:** .080" thick aluminum; Dampers > 18" dia. blade is reinforced**AXLE:** Continuous ½" dia. aluminum**BEARINGS:** Flange bronze oilite**SEALS:** On frame, closed cell neoprene, ¼" thick;
Temperature Range -35°F to 180°F**FINISH:** Mill**BS53 - Stainless Steel****FRAME:** 16-GA stainless steel, 7½" deep**BLADE:** 16-GA stainless steel, dampers > 20" dia. blade is reinforced**AXLE:** Continuous ½" dia. stainless steel**BEARINGS:** Flange bronze oilite**SEALS:** On frame, closed cell neoprene, ¼" thick;
Temperature Range -35°F to 180°F**FINISH:** No 2B type 304 stainless steel**OPTIONS**

Flanged Frame

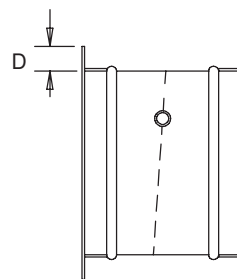
Counter Balance Assist or Resist

NOTES

1. Dampers are provided ⅛" undercut.
2. Counter balance is available mounted to the blade or installed on the shaft extended from damper. Damper sizes 12" diameter and less shall have a counter balance located on an extended shaft only.
3. Approximate shipping weight (lbs) can be calculated by multiplying the circumference (dia. x 3.141) by 0.5 for aluminum and steel; 0.3 for stainless steel.

DAMPER SIZES

Panels	Min Panel	Max Panel
BS51	4" dia.	36" dia
BS52	4" dia.	36" dia
BS53	4" dia.	36" dia



Optional Flange Frame
Equal leg angles are available.
They are welded to frames
at intermittent spacing and
caulked between welds.
Flange height "D" varies with
damper diameter.

air balance

Dampers  Louvers
UL Life Safety Products
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MODEL BS51/BS52/BS53

7½" Deep • Round • Galvanized Steel, Aluminum, or Stainless Steel Backdraft Damper

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MODEL BS55

4" Deep • Single Thickness Blade • -40°F to 190°F Temperature • Aluminum Backdraft Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: .081" thick 6063-T6/T52 extruded aluminum alloy;
1" x 4" x 1" channel frame on all sides

BLADES: .081" thick 6063-T6/T52 extruded aluminum alloy, designed
for strength and low leakage with overlapping edges

SHAFTS: ½" dia. extruded aluminum pin-lock design

BLADE SEALS: Silicone rubber off-set leg

BEARINGS: Celcon bearing material so that there will be no metal to
metal friction

LINKAGE: Face mounted in the airstream

FINISH: Mill

TEMP. LIMITS: -40°F to 190°F

OPTIONS

Aluminum (1½" x 6" x 1½") Frame

Flanged (2" x 4" x ½") Frame

Steel (Channel or Flange) Frame

Variety of Bird or Insect Screens

Linkage Out of Airstream

Polyurethane or Neoprene Jamb Seals

Oilite Bronze or Ball Bearings

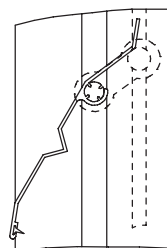
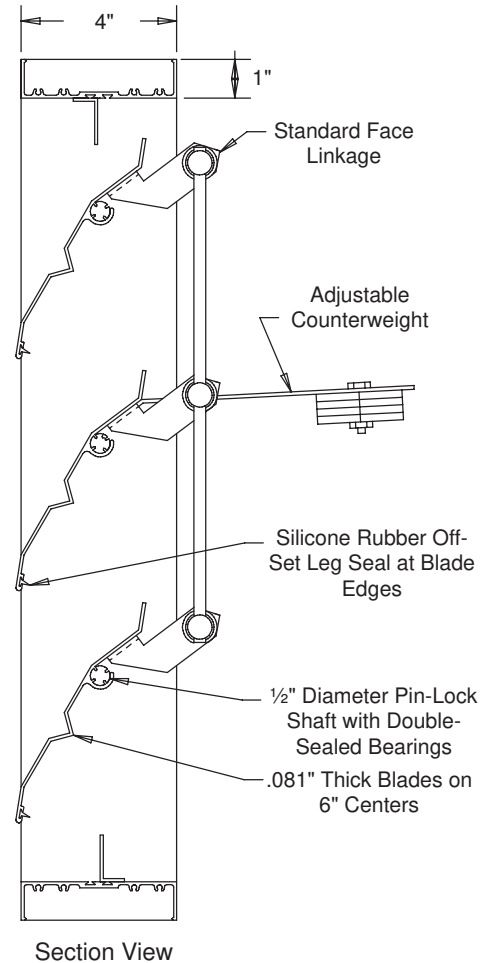
Counterweights

NOTES

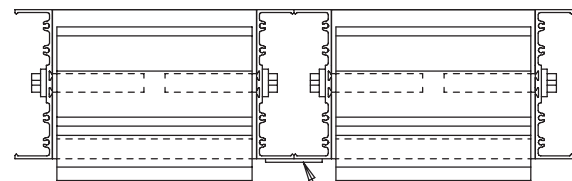
1. "A" width and "B" height are opening dimensions. Dampers are provided by inside dimension.
2. Counterweights are adjustable for infinite opening pressures. Optional locations. Specify if airstream is horizontal, vertical up or down. Specify to assist or resist opening. Specify locations internally (on blades) or externally (on external shaft).
3. When a non-symmetrical frame cross section is specified (example: flange frame) specify the flange/airflow orientation.
4. Approximate damper weight is 6½ lbs/sq.ft.

DAMPER SIZES

Panels	Min Panel	Max Single Panel
BS55	8"W x 8"H	48"W x 72"H



Optional Jamb
Linkage and Jamb
Seals



Top View

MODEL BS55

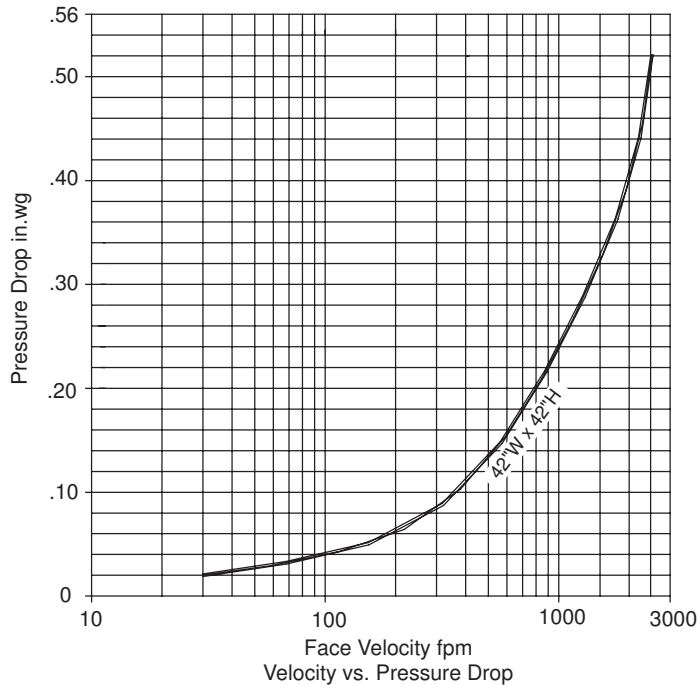
4" Deep • Single Thickness Blade • -40°F to 190°F Temperature • Aluminum Backdraft Damper

Typical performance for model BS55 Backdraft Damper. Size tested 42"W x 42"H, furnished with counterweight to assist opening.

Without Ductwork

Damper installed per AMCA 500 Fig. 5.4 (Face Mounted to a Plenum). Pressure is corrected to .075 lb./cu.ft. air density.

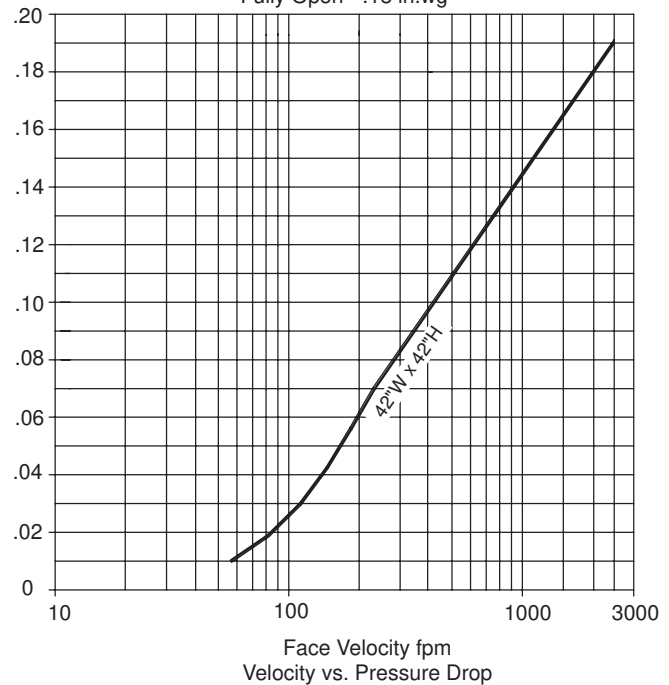
Operational Pressures
Start to Open - .01 in.wg
Fully Open - .52 in.wg



With Ductwork

Damper installed per AMCA 500 Fig. 5.3 (Ductwork installed upstream and downstream of damper). Pressure is corrected to .075 lb./cu.ft. air density.

Operational Pressures
Start to Open - .01 in.wg
Fully Open - .18 in.wg



Air Leakage:

Air leakage quantities shown in the chart are results of tests per AMCA standard 500 and are shown at .10 inwg differential pressure and corrected to .075 lb./cu.ft. air density.

Total CFM Air Leakage at .10" Static Pressure Differential Through Closed Damper

		Width						
Height		12	18	24	30	36	42	48
	12	3.0	4.5	6.0	7.5	9.0	10.5	12.0
	24	6.0	9.0	12.0	15.0	18.0	21.0	24.0
	36	9.0	13.5	18.0	22.5	27.0	31.5	36.0
	48	12.0	18.0	24.0	30.0	36.0	42.0	48.0
	60	15.0	22.5	30.0	37.5	45.0	52.5	60.0
	72	18.0	27.0	36.0	45.0	54.0	63.0	72.0

For determining leakage values greater than .10 in.wg to a maximum 4 in.wg use the multiplier correction chart below.

Static Pressure (in)	.2	.3	.4	.5	1.0	2.0	3.0	4.0
Multiplier Correction Factor	1.7	2.0	2.3	2.7	4.0	5.0	6.7	8.3

Air leakage ratings are based on AMCA standard 500 using test set up Fig. 5.4 with damper in the closed position without the aid of a counterweight or other mechanical means to provide closing torque. For a size 42"W x 42"H damper with blade and jamb seals.

MODEL BS66

4" Deep • Single Thickness Blade • -30°F - 180°F Temperature • Steel Backdraft Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 16-GA galvanized steel, hat-shaped channel frame
BLADES: 16-GA galvanized steel
BLADE SPACING: 8"
SHAFTS: 1/2" dia. plated steel stub 6" long, mono-bolted to blade
BLADE SEALS: oil impregnated sintered bronze, flanged sleeve
BEARINGS: 3/16" thick polyurethane foam
LINKAGE: 1/8" thick plated steel bracket with 1/2" dia. steel pivot in a celcon sleeve bearing; Linkage rod is 5/16" dia. aluminum, locked to pivot with 1/4-20 UNC plated steel set screw
FINISH: Mill
TEMP. LIMITS: -30°F to 180°F

OPTIONS

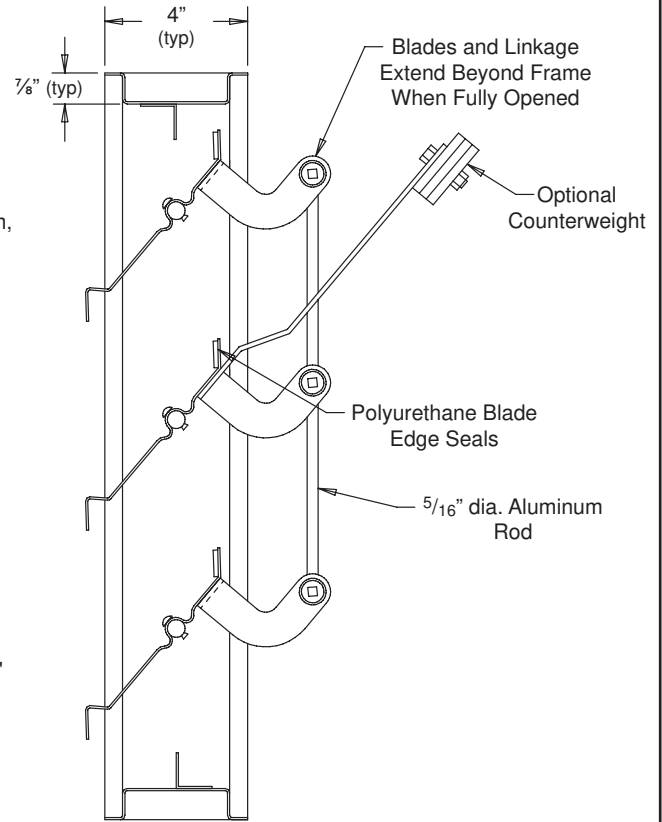
Stainless Steel, Other Steel Gauges (to 10-GA)
 Shafts to 1" diameter
 Aluminum Blades and shafts
 Neoprene Blade Edge Seals
 Polyurethane or Neoprene Jamb Seals
 Stainless Steel Shafts, or Linkage
 Adjustable Counterweights to Assist or Resist Opening
 Adjustable Counterweights for External Application on Extended Shaft
 Bearings in Nylon, Ball, Sintered, or Stainless Steel

NOTES

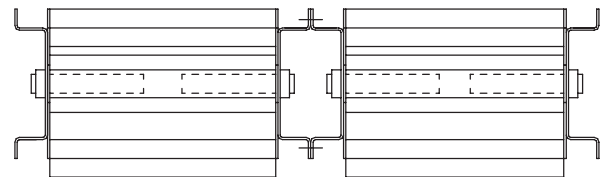
1. "A" width and "B" height are opening dimensions. Dampers are provided 1/4" undercut.
2. When a non-symmetrical frame cross section is specified (example: flange frame) specify the flange/airflow orientation - horizontal, vertical-up, or vertical down.
3. Approximate damper weight is 6 1/2 lbs./sq.ft.

DAMPER SIZES

Panels	Min Panel	Max Single Panel
BS66	8"W x 11"H	48"W x 72"H



Section View



Mullion Detail (typ)

Top View

MODEL BS66

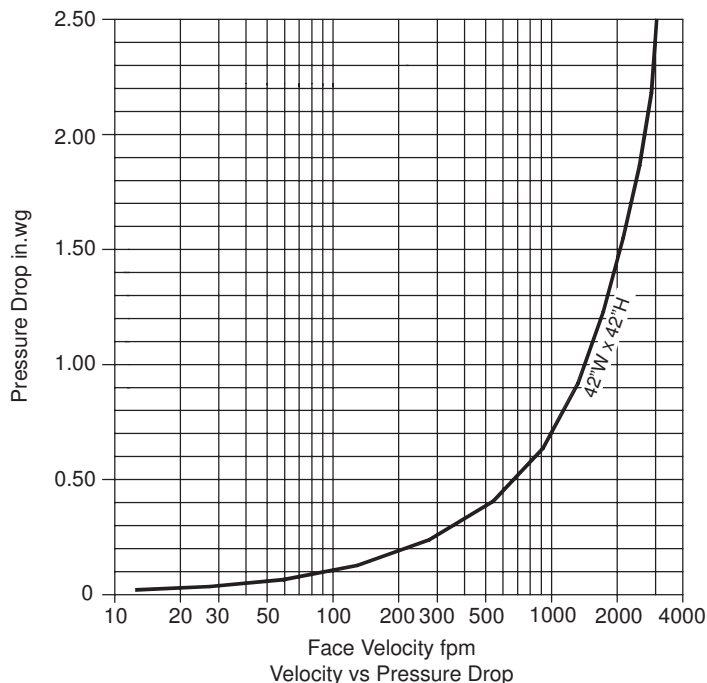
4" Deep • Single Thickness Blade • -30°F - 180°F Temperature • Steel Backdraft Damper

Typical performance for model BS66 backdraft damper. Size tested 42"W x 42"H, furnished with counterweight to assist opening.

Without Ductwork

Damper installed per AMCA 500 Fig. 5.4 (Face Mounted to a Plenum). Pressure is corrected to .075 lb./cu.ft air density.

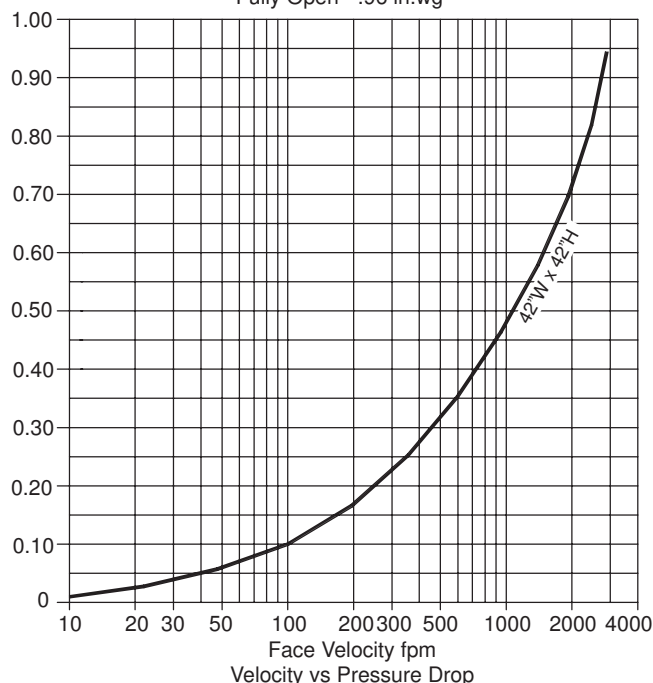
Operational Pressures
Start to Open - .01 in.wg
Fully Open - 2.5 in.wg



With Ductwork

Damper installed per AMCA 500 Fig. 5.3 (Ductwork installed upstream and downstream of damper). Pressure is corrected to .075 lb./cu.ft. air density.

Operational Pressures
Start to Open - .01 in.wg
Fully Open - .96 in.wg



Air Leakage:

Air leakage quantities shown in the chart are results of tests per AMCA Standard 500 and shown at 1 in.wg differential pressure and corrected to .075 lb./cu.ft. air density.

Total CFM Air Leakage at 1 in.wg Static Pressure Differential Through Closed Damper.

	Width						
	12	18	24	30	36	42	48
Height	12	8.3	12.5	16.6	20.8	24.9	29.0
	24	16.6	24.9	33.2	41.5	49.8	58.1
	36	24.9	37.4	49.8	62.3	74.7	87.2
	48	33.2	49.8	66.4	83.0	99.6	116.2
	60	41.5	62.3	83.0	103.8	124.5	145.3
	72	49.8	74.7	99.6	124.5	149.4	174.3

For determining leakage values greater than 1 in.wg to a maximum 4 in.wg use the multiplier correction chart below.

Static Pressure (in)	2	3	4
Multiple Correction Factor	1.22	1.63	1.99

Air leakage ratings are based on AMCA Standard 500 using test set up Fig. 5.4 with damper in the closed position without the aid of a counterweight or other mechanical means to provide closing torque, for a size 42"W x 42"H damper with blade and jamb seals.

MODEL BID4

4" Deep • "Tear Drop" Design Blade • 180°F Max. Temperature • Formed Steel Backdraft Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 10-GA thick, galvanized steel

BLADES: 16-GA thick, galvanized steel

BLADE SPACING: 3 $\frac{3}{8}$ " minimum to 7 $\frac{1}{8}$ " maximum

LINKAGE: $\frac{1}{8}$ " thick plated steel bracket with $\frac{1}{2}$ " dia. plated steel pivot riding in a celcon sleeve bearing; Linkage rod is $\frac{5}{16}$ " dia. aluminum locked to pivot with a $\frac{1}{4}$ "-20 UNC plated steel set screw; single linkage for panels < 20"W; double linkage for panels > 20"W

AXLES: $\frac{3}{4}$ " dia. steel; Full length of blade

BEARINGS: Bronze oilite

SEALS: Polyurethane on blade edges, none at jams

FINISH: Mill

OPTIONS

Frames that Completely Contain Blades and Linkage

Flange Frame (Airflow Must be Specified)

Jamb Seals to Provide Low Leakage

Stainless Steel Blade Seal (0.010" thick)

Counterweights (Assist or Resist Must be Specified)

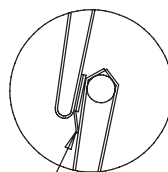
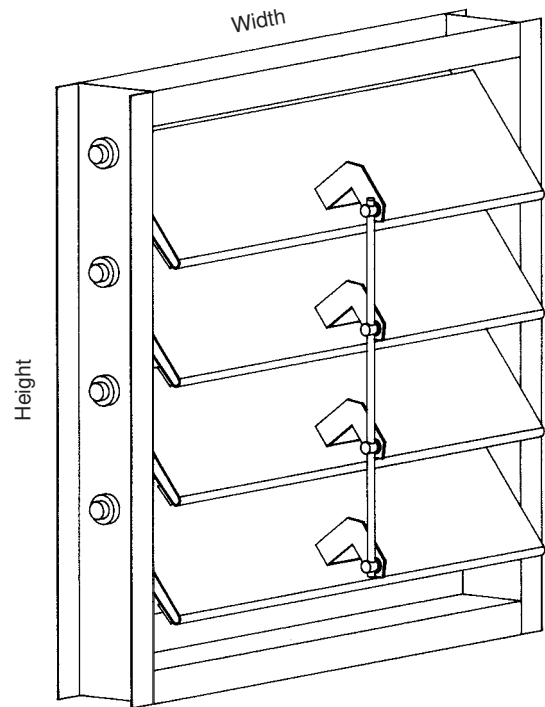
Variety of Bird and Insect Screens

NOTES

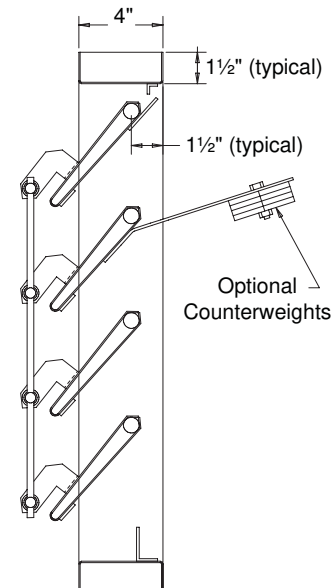
1. "A" width and "B" height are opening dimensions. Dampers are provided approximately $\frac{1}{2}$ " undersize.

DAMPER SIZES

Panels	Min Panel	Max Single Panel
BID4	12"W x 12"H	48"W x 72"H



Optional Stainless Steel Blade Seal; .010" Thick

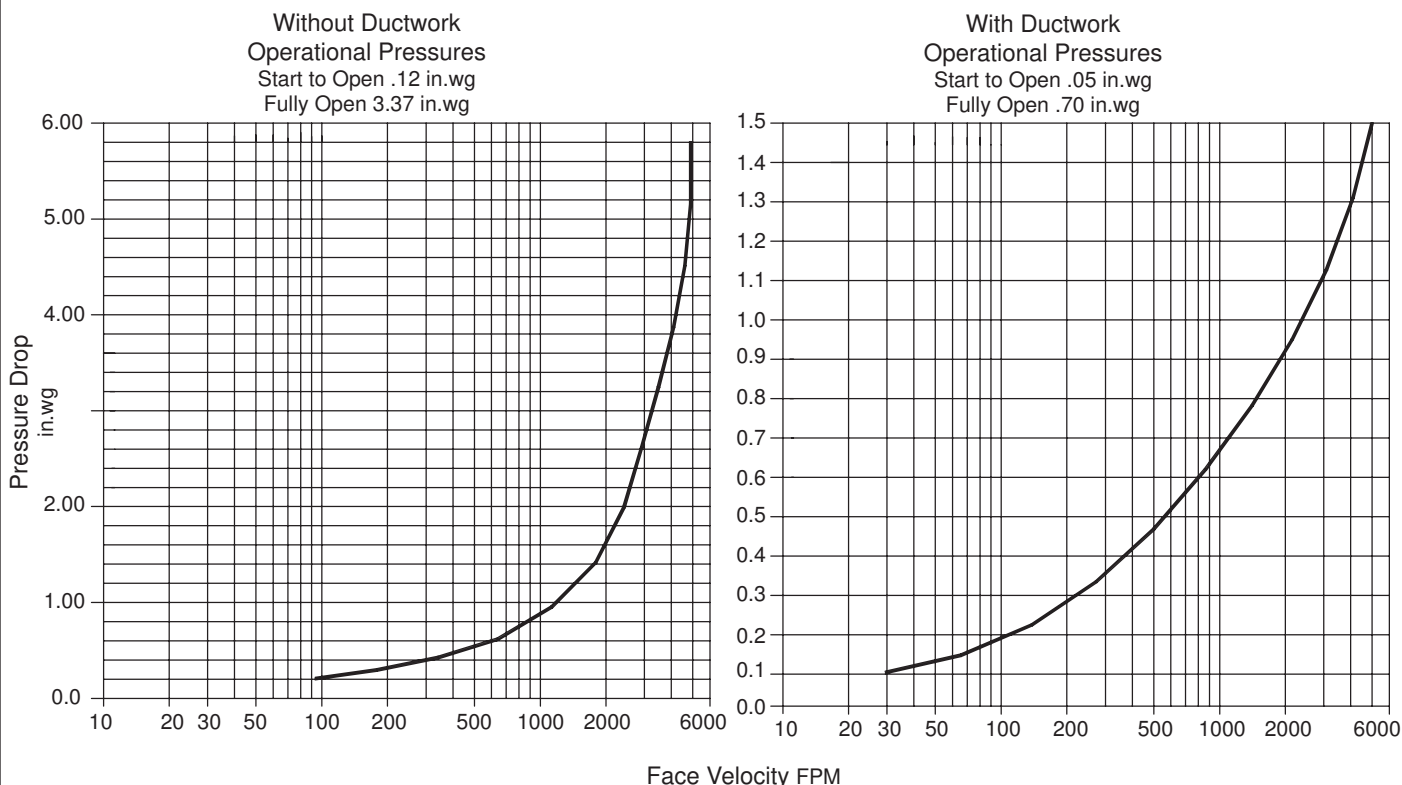


MODEL BID4

4" Deep • "Tear Drop" Design Blade • 180°F Max. Temperature • Formed Steel Backdraft Damper

Pressure Drop:

Performance is based on AMCA Standard 500, Figure 5.4 (without ductwork) or Figure 5.3 (in-duct mount), operating temperatures below 180°F and a standard air density of 0.75 lb/ft³. Actual pressure drop performance will vary based on damper size and exact installation configuration. The curves shown below are furnished with counterweights to assist opening.



Typical performance for BID4 backdraft damper size tested 42"W x 42"H furnished with counterweight to assist opening.

Air Leakage:

Air leakage quantities shown in the chart are results of tests per AMCA Standard 500 and are shown at 1 in.wg differential pressure and corrected to 0.75 lb/cu.ft. air density. For determining leakage values greater than 1 in.wg to a maximum 10 in.wg use the multiplier correction chart.

Total CFM Air Leakage at 1 in.wg
Differential Through Closed Damper

	Width							
Height		12	18	24	30	36	42	48
	12	8	12	16	20	24	28	32
	24	16	24	32	40	48	56	64
	36	24	36	48	60	72	84	96
	48	32	48	64	80	96	112	128
	60	40	60	80	100	120	140	160
	72	48	72	96	120	144	168	192

For determining leakage values greater than 1 in.wg to a maximum 10 in.wg use the multiplier correction chart below.

Static Pressure	2	3	4	5	6	7	8	9	10
Multiplier Correction Factor	1.3	1.5	1.8	2.0	2.3	2.5	2.8	3.0	3.3

Air leakage ratings are based on AMCA Standard 500 using test set up Fig. 5.4 with damper in the closed position without the aid of a counterweight or other mechanical means to provide closing torque. For a size 42"W x 42"H damper with blade and jamb seals.

MODEL BID9

10" Deep • "Tear Drop" Design Blade • -30°F to 190°F Temperature • Formed Steel Backdraft Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 2" x 10" x 2" 12-GA galvanized steel formed channel

BLADE: .080" thick, extruded 6063-T52/T6 with groove inserts at blade edges for extruded silicone rubber seals

BLADE SPACING: 6" centers

LINKAGE: Standard is 1/8" thick plated steel bracket with 1/2" dia. plated steel pivot riding in a celcon sleeve bearing; Linkage rod is 5/16" dia. locked to pivot with a 1/4"-20 UNC plated steel set screw

AXLES: 3/4" dia. plated steel positively locked to blade, placed off-center in blade

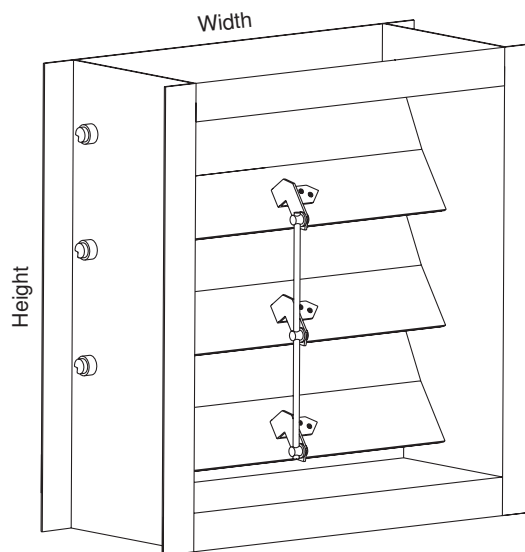
SEALS: Extruded silicone rubber off-set leg at blade edges; None at jambs

BEARINGS: Ball bearing pressed into frame

COUNTERWEIGHTS: Adjustable for a full range of opening pressures; Specify if airflow is horizontal, vertical-up, or vertical-down; Also specify to assist or resist opening

FINISH: Mill

TEMP. LIMITS: -30°F to 190°F



OPTIONS

Flange Frame (Airflow Must be Specified)

Counterweights (Assist or Resist Must be Specified)

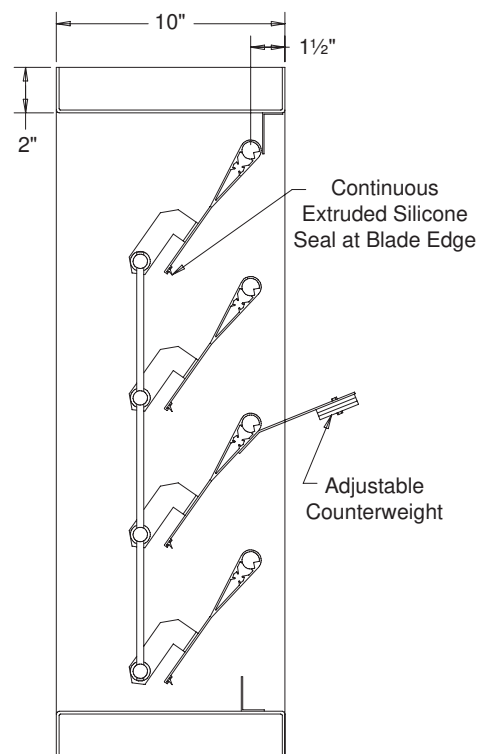
Horizontal or Vertical Mount

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided by inside dimension.

DAMPER SIZES

Panels	Min Panel (ID)	Max Single Panel (ID)
BID9	8"W x 8"H	60"W x 96"H

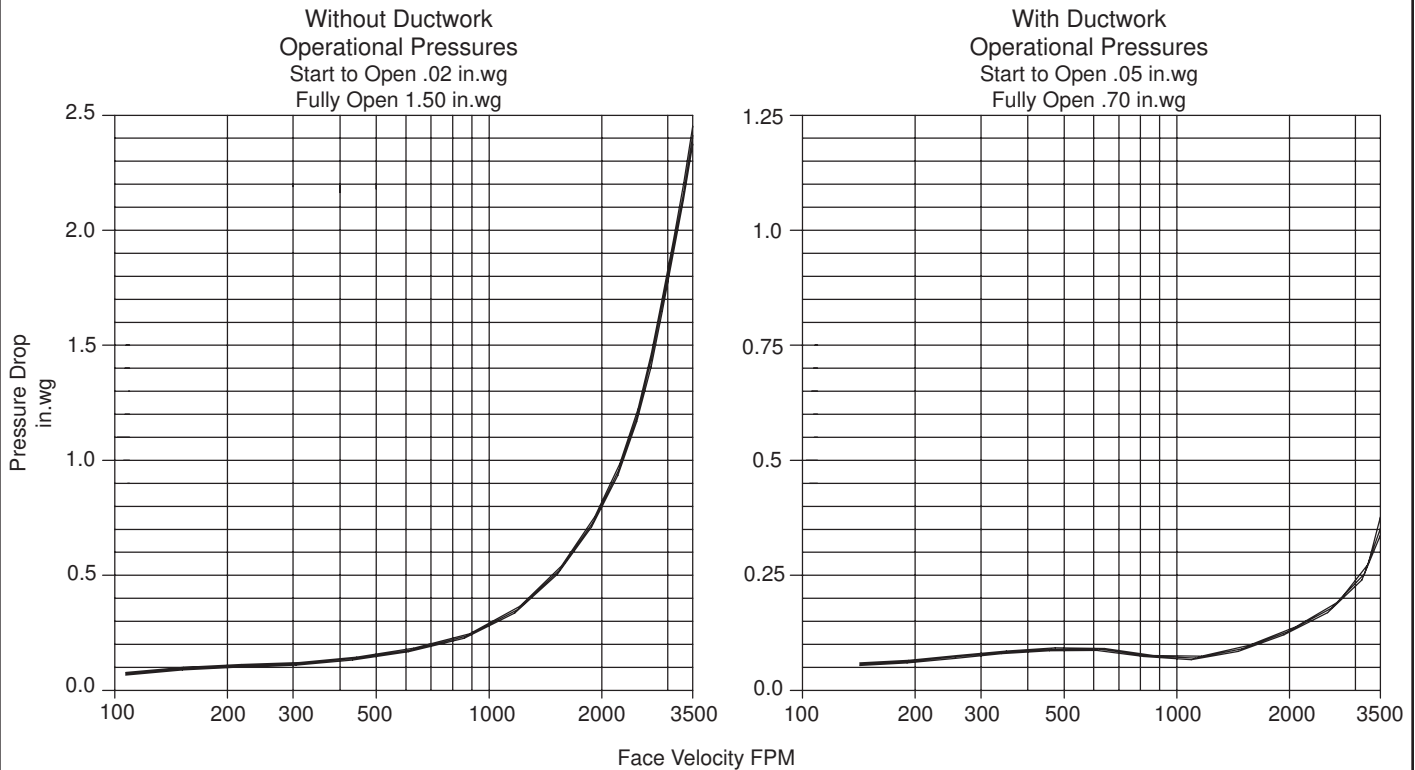


MODEL BID9

10" Deep • "Tear Drop" Design Blade • -30°F to 190°F Temperature • Formed Steel Backdraft Damper

Pressure Drop:

Performance is based on AMCA Standard 500, Figure 5.4 (without ductwork) or Figure 5.3 (in-duct mount), operating temperatures below 190°F and a standard air density of 0.75 lb/ft³. Actual pressure drop performance will vary based on damper size and exact installation configuration. The curves shown below are furnished with counterweights to assist opening.



Typical performance for BID9 backdraft damper size tested 42"W x 42"H furnished with counterweight to assist opening.

Air Leakage:

Air leakage quantities shown in the chart are results of tests per AMCA Standard 500 and are shown at 1 in.wg differential pressure and corrected to 0.75 lb/cu.ft. air density. For determining leakage values greater than 1 in.wg to a maximum 10 in.wg use the multiplier correction chart.

Total CFM Air Leakage at 1 in.wg
Differential Through Closed Damper

		Width								
Height		12	18	24	30	36	42	48	54	60
	12	5	12	16	20	24	28	32	36	40
	24	16	24	32	40	58	56	64	72	80
	36	24	36	48	60	72	84	96	108	120
	48	32	48	64	80	96	112	128	144	160
	60	40	60	80	100	120	140	150	180	200
	72	48	72	96	120	144	168	192	216	240
	84	56	84	112	140	168	196	224	252	280
	96	64	96	128	160	192	224	256	288	320

For determining leakage values greater than 1 in.wg to a maximum 8 in.wg use the multiplier correction chart below.

Static Pressure	2	3	4	5	6	7	8
Multiplier Correction Factor	1.5	1.9	2.3	2.5	2.9	3.0	3.1

*Maximum panel size limit 60"W x 96"H for static pressure limits greater than 5 in.wg to 8 in.wg differential maximum panel size limit 48"W x 96"H.

Air leakage ratings are based on AMCA Standard 500 using test set up Fig 5.4 with damper in the closed position without the aid of a counterweight or other mechanical means to provide closing torque, for a size 42"W x 42"H damper with blade and jamb sealed.

Fire Dampers

- 119F — 1- $\frac{5}{8}$ " Deep, 1½ Hour, Vertical Thinline, Static
- 119 — 4- $\frac{7}{8}$ " Deep, 1½ Hour, Vertical or Horizontal, Static
- R19 — 4- $\frac{1}{2}$ " Deep, Vertical – Dynamic, Horizontal – Static
- RF — 16" Deep, True Round Vertical or Horizontal, Dynamic
- D19 — 4- $\frac{7}{8}$ " Deep, 1½ Hour, Vertical or Horizontal, Dynamic
- MD19 — 1½ Hour, Single Thickness Multi-Blade, Vertical or Horizontal, Dynamic
- MA19 — 1½ Hour, Airfoil Multi-Blade, Vertical or Horizontal, Dynamic
- 319 — 4- $\frac{7}{8}$ " Deep, 3 Hour, Vertical or Horizontal, Static
- D39 — 4- $\frac{7}{8}$ " Deep, 3 Hour, Vertical or Horizontal, Dynamic
- MD39 — 3 Hour, Single Thickness Multi-Blade, Vertical or Horizontal, Dynamic
- MA39 — 3 Hour, Airfoil Multi-Blade, Vertical or Horizontal, Dynamic

- Supplemental Info — B-Pan Transition
- Supplemental Info — Transition – Round, Oval, or Square
- Supplemental Info — X-Style Sleeve
- Supplemental Info — Stainless Steel
- Supplemental Info — PK1202
- Supplemental Info — Out of Wall Curtain Fire Dampers
- Supplemental Info — Grille Transfer for Curtain Fire Dampers
- Supplemental Info — Sleeve Extensions
- Supplemental Info — Installation of Flanged Duct Connection for UL Dampers

air balance

Dampers  Louvers
UL Life Safety Products

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MODEL 119F

1 5/8" Deep • 1 1/2 Hour • Vertical Mount • Static Rated • Thin Line Fire Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 22-GA one-piece rollformed galvanized steel
BLADE: 22-GA galvanized steel curtain-type
FUSIBLE LINK: UL-Listed 165°F; Replaceable
FINISH: Mill

OPTIONS

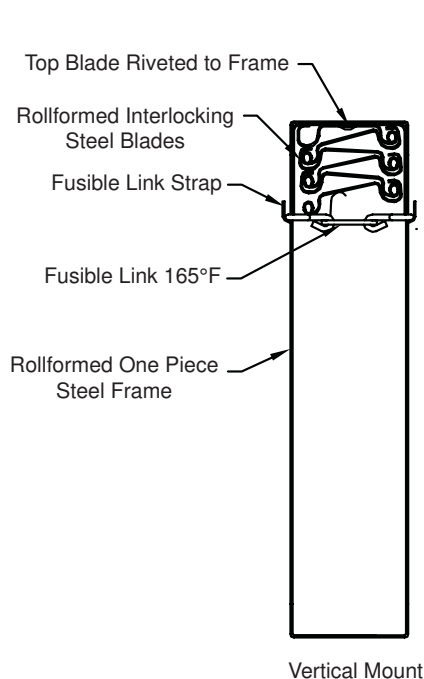
212°F Replaceable Fuse Link
 Factory Supplied Sleeve (20-GA through 10-GA)
 PK1202 Position Indicator Switch
 Tab-Lock Retaining Angles
 Pull Ring

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided 1/4" undercut.


DAMPER SIZES

Panels	Min Panel	Max Single Panel
119F	4"W x 4"H	40"W x 40"H



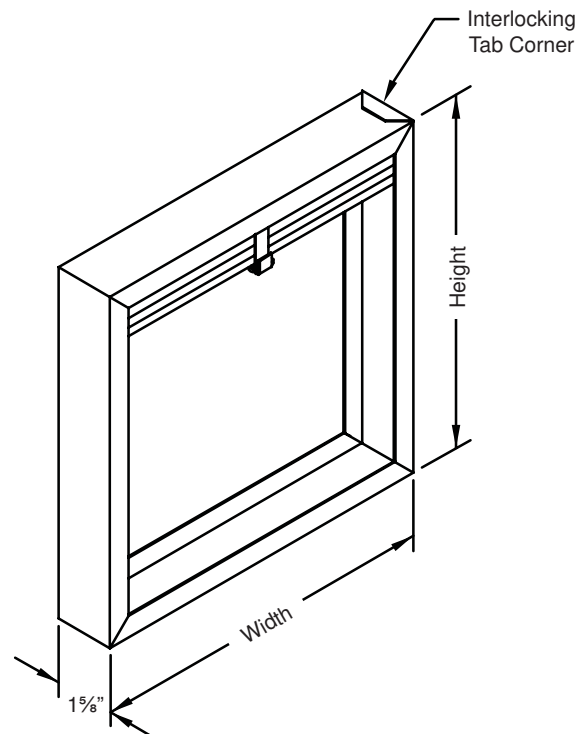
UNDERWRITERS LABORATORIES, INC.®
 CLASSIFIED STATIC FIRE DAMPERS
 FIRE RESISTANCE RATING 1 1/2 HR.

abi air balance inc. FILE #R4708

CLASSIFIED


This fire damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555
- National Fire Protection Association Standard 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:100
- Underwriters Laboratories Inc. Approved for dual direction airflow and static closure conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.



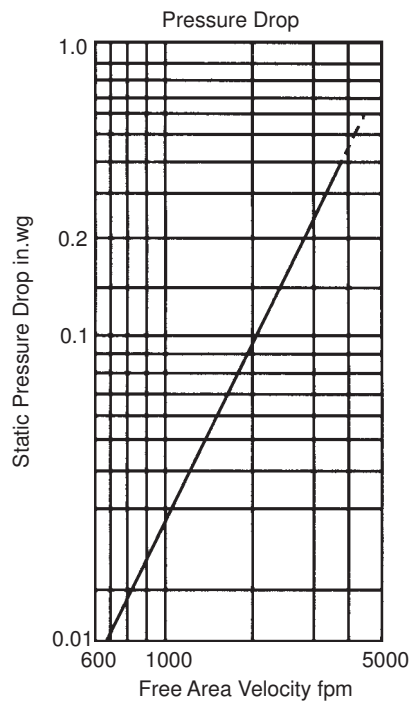
MODEL 119F

1½" Deep • 1½ Hour • Vertical Mount • Static Rated • Thin Line Fire Damper

Free Area 119F

		Width									
Height		4	8	12	16	20	24	28	32	36	40
	4	0.03	0.08	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5
	8	0.1	0.2	0.4	0.5	0.6	0.8	0.9	1.0	1.2	1.3
	12	0.2	0.4	0.6	0.8	1.1	1.3	1.5	1.8	2.0	2.2
	16	0.2	0.5	0.8	1.2	1.5	1.8	2.1	2.4	2.7	3.1
	20	0.3	0.7	1.10	1.5	1.9	2.3	2.8	3.2	3.6	4.0
	24	0.3	0.8	1.3	1.8	2.3	2.8	3.3	3.8	4.3	4.8
	28	0.4	1.0	1.6	2.2	2.8	3.5	4.1	4.7	5.3	5.9
	32	0.4	1.1	1.8	2.5	3.2	3.9	4.5	5.2	5.9	6.6
	36	0.5	1.3	2.1	2.8	3.6	4.4	5.2	6.0	6.8	7.5
	40	0.5	1.4	2.3	3.2	4.0	4.9	5.8	6.6	7.5	8.4

$$\text{Free Area Velocity (fpm)} = \frac{\text{Flow (cfm)}}{\text{Free Area (sq.ft.)}}$$



MODEL 1194 $\frac{7}{8}$ " Deep • 1½ Hour • Vertical or Horizontal Mount • Static Rated • Fire Damper**STANDARD MATERIALS AND CONSTRUCTION****FRAME:** 22-GA galvanized steel, one-piece rollformed**BLADE:** 22-GA galvanized steel, curtain type**FUSIBLE LINK:** UL-Listed 165°F; Replaceable**CLOSURE SPRINGS:** Horizontal Models - Heat-treated Type 301 stainless steel constant force coiled negator type**FINISH:** Mill**UNDERWRITERS LABORATORIES, INC.®**
CLASSIFIED STATIC FIRE DAMPERS
FIRE RESISTANCE RATING 1½ HR.**abi**

air balance inc.

FILE #R4708



This fire damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555
- National Fire Protection Association Standard 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:100
- Underwriters Laboratories Inc. Approved for dual direction airflow and static closure conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.

OPTIONS

212°F Replaceable Fusible Link

Factory-Supplied Sleeves (20-GA through 10-GA)

Type 304 Stainless Steel Construction

PK1202 Position Indicator Switch

B-Pan, Round, Oval, or Square Transitions

Multiple Panel Unit Assembly

Tab-Lock Retaining Angles

Perimeter Flange

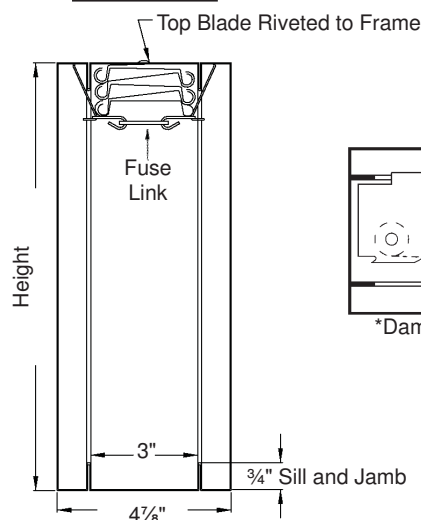
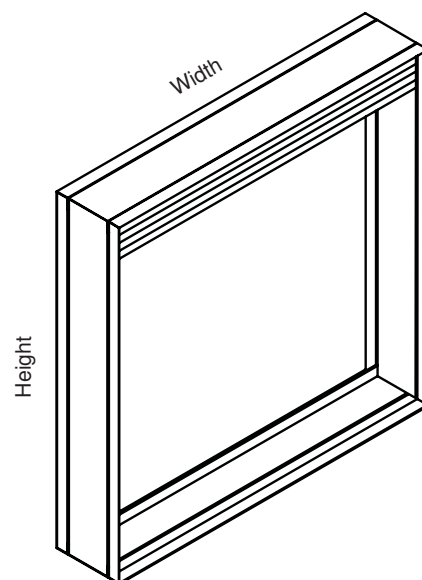
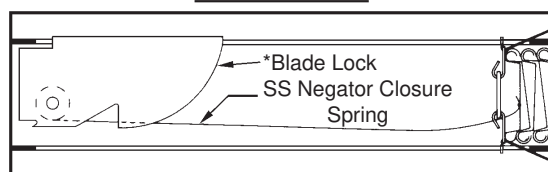
Pull Ring

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided ¼" undercut.
2. Unassembled multiple units do not include mullions.
3. See SI-SSFD for information regarding Stainless Steel Fire Dampers.

DAMPER SIZES

Orientation	Hor & Ver	Horizontal (floor)		Vertical (wall)	
Panels	Min Panel	Max Single Panel	Max Assy Panel	Max Single Panel	Max Assy Panel
119A	4"W x 4"H	48"W x 48"H	102"W x 48"W (36"W x 48"H each section)	60"W x 60"H	120"W x 120"W (40"W x 60"H each section)
119B	4"W x 3"H (duct) 4"W x 5"H (frame)	48"W x 43"H (duct) (48"W x 48"H frame)	102"W x 43"H (duct) (102"W x 48"H frame) (36"W x 43"H each section duct)	60"W x 55"H (duct) (60"W x 60"H frame)	120"W x 115"H (duct) (120"W x 120"H frame) (40"W x 60"H each section duct)
119C	4"W x 4"H (duct) (6"W x 7"H frame)	46"W x 42"H (duct) (48"W x 48"H frame)	100"W x 42"H (duct) (102"W x 48"H frame)	58"W x 54"H (duct) (60"W x 60"H frame)	118"W x 114"H (duct) (120"W x 120"H frame)

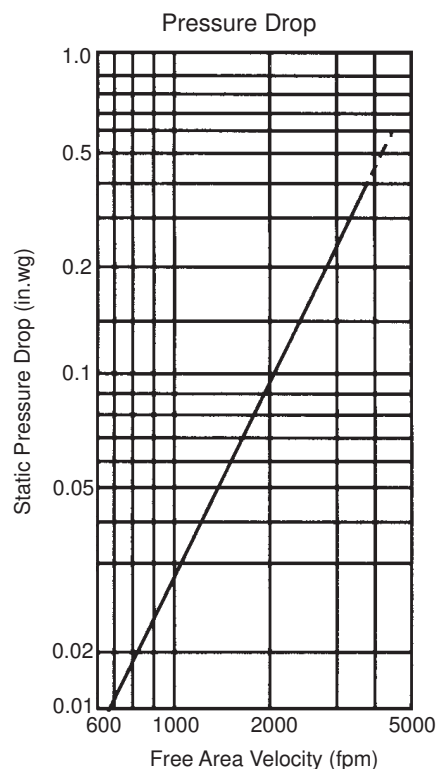
Vertical Mount**Horizontal Mount**

MODEL 1194 $\frac{7}{8}$ " Deep • 1½ Hour • Vertical or Horizontal Mount • Static Rated • Fire Damper

Free Area (sq.ft.) 119A

		Width														
Height		4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	4	.03	.09	.16	.22	.28	.34	.40	.46	.52	.58	.64	.70	.76	.82	.89
	8	.09	.26	.42	.58	.75	.91	1.08	1.24	1.40	1.57	1.73	1.89	2.06	2.22	2.39
	12	.15	.41	.68	.94	1.21	1.47	1.74	2.00	2.27	2.53	2.79	3.06	3.32	3.59	3.85
	16	.21	.57	.94	1.30	1.67	2.03	2.40	2.76	3.13	3.49	3.86	4.22	4.59	4.95	5.32
	20	.27	.74	1.21	1.69	2.16	2.64	3.11	3.58	4.06	4.53	5.00	5.48	5.95	6.43	6.90
	24	.32	.90	1.47	2.05	2.62	3.20	3.77	4.35	4.92	5.49	6.07	6.64	7.22	7.79	8.37
	28	.38	1.06	1.74	2.41	3.09	3.77	4.44	5.12	5.80	6.47	7.15	7.83	8.51	9.18	9.86
	32	.44	1.21	1.99	2.77	3.55	4.32	5.10	5.88	6.66	7.43	8.21	8.99	9.77	10.54	11.32
	36	.50	1.39	2.27	3.16	4.04	4.93	5.82	6.70	7.59	8.48	9.36	10.25	11.14	12.02	12.91
	40	.56	1.55	2.54	3.52	4.51	5.50	6.49	7.48	8.47	9.46	10.45	11.44	12.43	13.42	14.41
	44	.62	1.72	2.81	3.91	5.01	6.11	7.21	8.30	9.40	10.50	11.60	12.70	13.79	14.89	15.99
	48	.68	1.88	3.08	4.28	5.48	6.68	7.88	9.08	10.29	11.49	12.69	13.89	15.09	16.29	17.49
	52	.73	2.03	3.33	4.63	5.92	7.22	8.52	9.82	11.12	12.42	13.72	15.02	16.32	17.61	18.91
	56	.79	2.19	3.59	4.99	6.40	7.80	9.20	10.60	12.01	13.41	14.81	16.21	17.61	19.02	20.42
	60	.84	2.33	3.82	5.31	6.79	8.28	9.77	11.26	12.75	14.24	15.73	17.22	18.71	20.20	21.69

$$\text{Free Area Velocity (fpm)} = \frac{\text{Flow (cfm)}}{\text{Free Area (sq.ft.)}}$$



For Free Area and Pressure Drop information for the B-Pan Transition, see SI-BPAN.

For Free Area and Pressure Drop information for Round, Oval or Square Transition, see SI-TRFD.

In the interest of product development, Air Balance reserves the right to make changes without notice.

P.O. Box 606 • 7435 Industrial Rd. • Florence, KY 41042 • Phone: (859) 538-3400 • Fax: (859) 647-7810

MODEL R19

4½" Deep • 1½ Hour • Static - Horizontal Mount • Dynamic - Vertical Mount • Fire Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 20-GA galvanized steel for dampers ≤ 10" diameter
16-GA galvanized steel for dampers ≥ 11" diameter
BLADE: Stainless steel curtain type
FUSIBLE LINK: UL-Listed 165°F; Replaceable
FINISH: Mill

OPTIONS

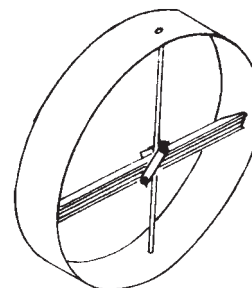
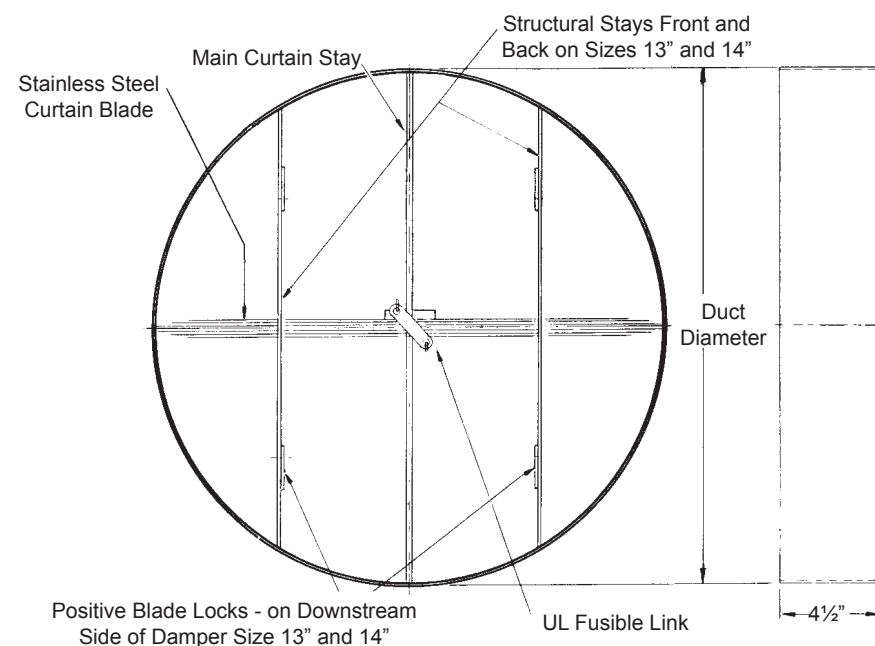
212°F Fusible Link
Retaining Angle Rings (sizes 8" - 14")

NOTES

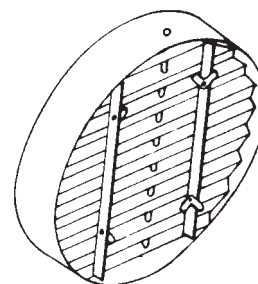
1. Dampers are provided ¼" undercut.
2. Dampers available in 1" increments only.
3. Dampers are static rated on horizontally and vertically mounted dampers.
4. Damper are dynamically rated on vertically mounted dampers only.

DAMPER SIZES

Panels	Min Panel	Max Single Panel
R19	4" dia.	14" dia.



Open Position



Closed Position

UNDERWRITERS LABORATORIES, INC.®

CLASSIFIED FIRE DAMPERS
FIRE RESISTANCE RATING 1½ HR.

abi

air balance inc.

FILE #R4708



This fire damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555
- National Fire Protection Association Standard 80 and 90A
- California State Fire Marshal Listing #3225-0412:002
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions and dynamic closure conditions for vertical mount and static closure conditions for horizontal mount
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.

air balance

Dampers Louvers
UL Life Safety Products
Division of Mestek
Member of AMCA

June 2009

MODEL R19

4½" Deep • 1½ Hour • Static - Horizontal Mount • Dynamic - Vertical Mount • Fire Damper

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MODEL RF

Dynamic Rated • Galvanized Steel • True Round Fire Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 20-GA galvanized rolled frame; 16" deep
BLADES: 20-GA double thickness galvanized steel (equal to 14-GA)
AXLES: ½" diameter galvanized or plated steel, full length
BEARING: Oil impregnated bronze sleeve
STOPS: Full open and full closed angle stops
CAULKING: UL approved
FINISH: Mill
ACTUATOR: Non-motorized spring closure mechanism with 165°F fusible link

OPTIONS

Integral Dual position Indication (IDPI) switches
 Rolled retaining angles
 Stainless steel bearings
 212°F Fusible Link
 Retaining Plates

NOTES

1. Dampers are provided approximately ⅛" undersize.
2. Dampers available in 2" increments only.
3. Dampers ≥ 20" require factory mounted rings in center of damper.

DAMPER SIZES

		2000 fpm, 4 in.wg		3000 fpm, 4 in.wg	
Orientation	Hor & Vert	Hor & Vert	Hor & Vert	Hor & Vert	Hor & Vert
Panels	Minimum Panel	Maximum Panel	Maximum Panel	Maximum Panel	Maximum Panel
RF	8" dia.	24" dia.	24" dia.	24" dia.	24" dia.

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED DYNAMIC FIRE DAMPER
 FIRE RESISTANCE RATING 1½ HR

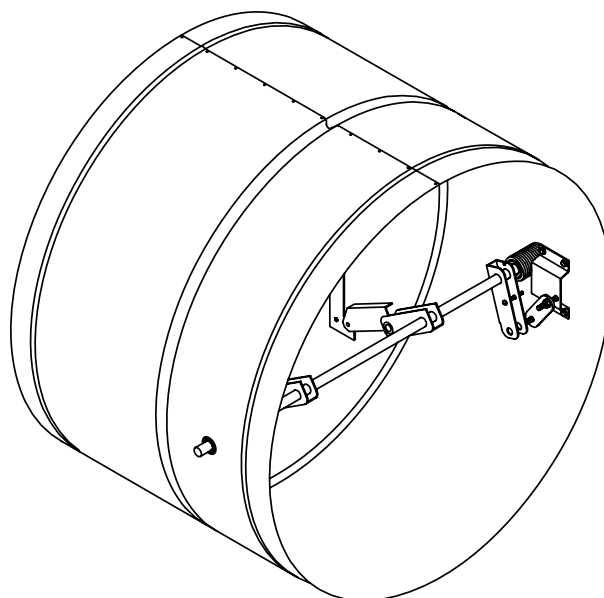
abi air balance

FILE #R4708



This fire damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555
- National Fire Protection Association Standards 80 and 90A
- California State Fire Marshal Listing 3225-1328:125
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.



MODEL RF

Dynamic Rated • Galvanized Steel • True Round Fire Damper

Operations Ratings:

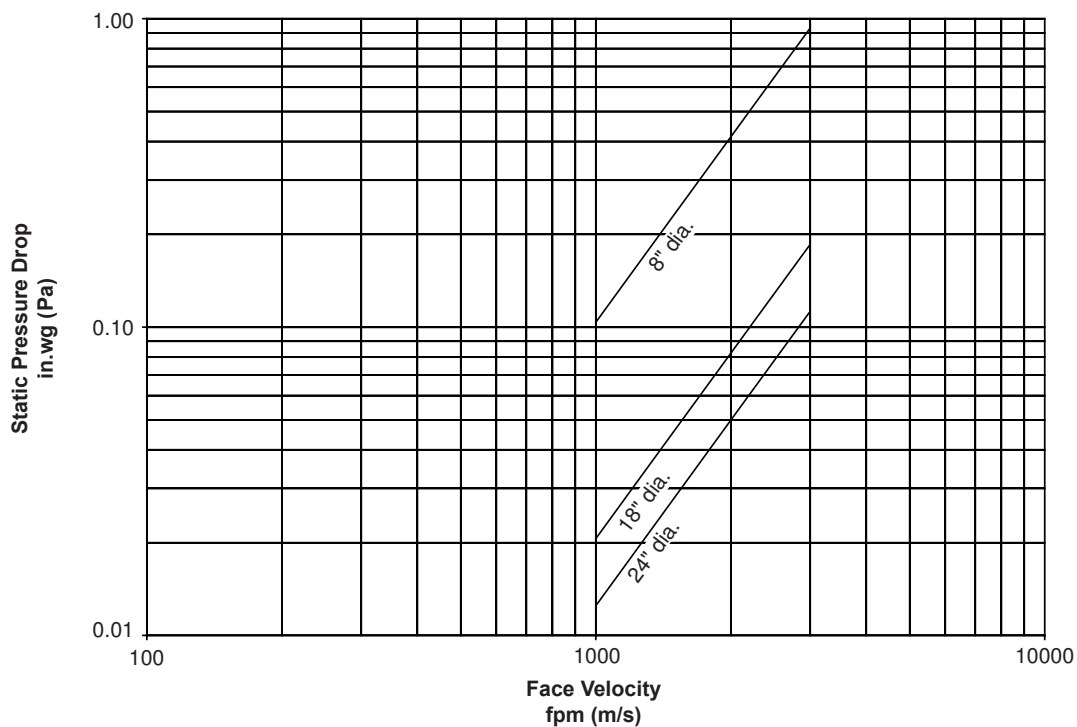
Maximum Differential Pressure: 4 in.wg
Maximum Velocity: 3000 fpm

Sound Ratings:

None Available

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with
AMCA Standard 500D.

AMCA Figure 5.3

MODEL D194 $\frac{7}{8}$ " Deep • 1 $\frac{1}{2}$ Hour • Vertical or Horizontal Mount • Dynamic Fire Damper**STANDARD MATERIALS AND CONSTRUCTION****FRAME:** 22-GA galvanized steel, one-piece rollformed**BLADE:** 22-GA galvanized steel, curtain type**FUSIBLE LINK:** UL-Listed 165°F; Replaceable**CLOSURE SPRINGS:** Heat-treated Type 301 stainless steel constant force coiled negator type**FINISH:** Mill**UNDERWRITERS LABORATORIES INC.®**

CLASSIFIED DYNAMIC FIRE DAMPER

FIRE RESISTANCE RATING 1 $\frac{1}{2}$ HR

abi air balance

FILE #R4708



This fire damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555
- National Fire Protection Association Standard 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:100
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.

OPTIONS

212°F Replaceable Fusible Link (Vertical Mount Only)

Factory-Supplied Sleeves (20-GA through 10-GA)

PK1202 Position Indicator Switch

B-Pan, Round, Oval, or Square Transitions

Tab-Lock Retaining Angles

Perimeter Flange

Pull Ring

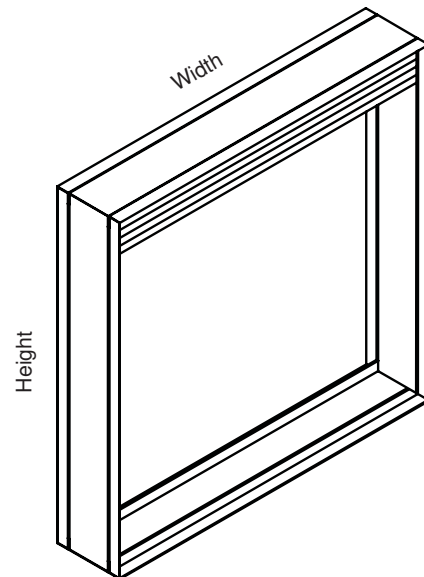
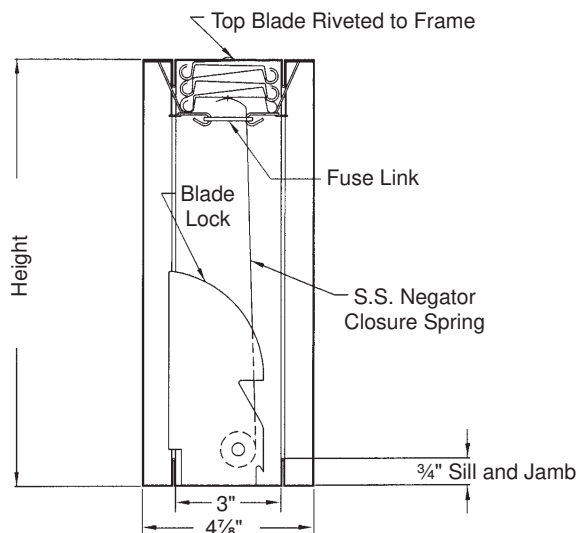
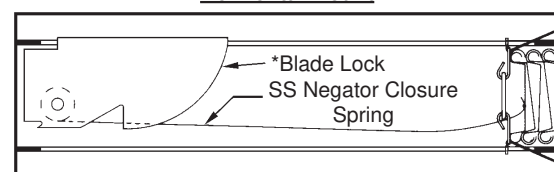
NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided $\frac{1}{4}$ " undercut.

DAMPER SIZES

Orientation	Hor & Vert	2000 fpm, 4 in.wg			4000 fpm, 4 in.wg
		Horizontal (floor)	Vertical (wall)		Vertical (wall)
Panels	Min Panel	Max Single Panel	Max Single Panel*	Max Assembly	Max Single Panel
D19A	4"W x 4"H	24"W x 24"H	36"W x 36"H	72"W x 36"H	18"W x 36"H
D19B	4"W x 3"H (duct) (4"W x 5"H frame)	24"W x 21"H (duct) (24"W x 24"H frame)	36"W x 32"H (duct) (36"W x 36"H frame)	72"W x 32"H (duct) (72"W x 36"H frame)	18"W x 32"H (duct) (18"W x 36"H frame)
D19C	4"W x 4"H (duct) (6"W x 7"H frame)	22"W x 20"H (duct) (24"W x 24"H frame)	34"W x 31"H (duct) (36"W x 36"H frame)	70"W x 31"H (duct) (72"W x 36"H frame)	16"W x 31"H (duct) (18"W x 36"H frame)

*Dampers greater than 36"W have a maximum single panel size of 18"W.

Vertical Mount**Horizontal Mount**

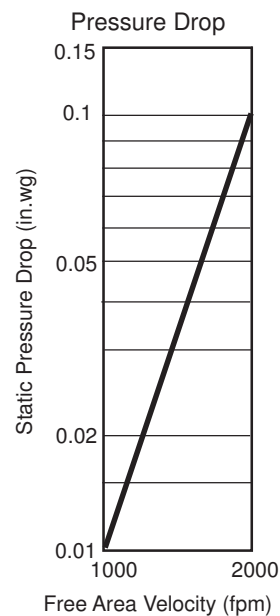
*Damper to be installed with blade lock points facing downward and with access from above

MODEL D194 $\frac{7}{8}$ " Deep • 1½ Hour • Vertical or Horizontal Mount • Dynamic Fire Damper

Free Area D19A

		Width							
Height		8	12	16	20	24	28	32	36
	8	.2	.4	.6	.7	.9	1.0	1.2	1.4
	12	.4	.7	.9	1.2	1.5	1.8	2.0	2.3
	16	.6	.9	1.3	1.7	2.0	2.4	2.8	3.1
	20	.7	1.2	1.7	2.1	2.6	3.1	3.5	4.0
	24	.9	1.4	2.0	2.6	3.2	3.7	4.3	4.9
	28	1.0	1.7	2.4	3.0	3.7	4.4	5.0	5.7
	32	1.2	2.0	2.7	3.5	4.3	5.1	5.8	6.6
	36	1.3	2.2	3.1	4.0	4.8	5.7	6.6	7.4

$$\text{Free Area Velocity (fpm)} = \frac{\text{Flow (cfm)}}{\text{Free Area (sq.ft.)}}$$



For Free Area and Pressure Drop information for the B-Pan Transition see SI-BPAN.

For Free Area and Pressure Drop information for the Round, Oval or Square Transition see SI-TRFD.

MODEL MD19

Non-Motorized • Single Thickness Blade • 1½ Hour • Dynamically Rated • UL Classified Fire Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7⁄8" x 16-GA galvanized steel hat channel
BLADES: 16-GA galvanized steel, 6" nominal width, parallel action
AXLES: Square, plated solid steel stub
BEARINGS: Oil impregnated bronze
LINKAGE: Plated steel angle and crank plates with stainless steel pivots in-jamb type
STOPS: 18-GA galvanized steel at head and sill
JAMB SEALS: Stainless Steel
FINISH: Mill
ACTUATOR: Non-motorized spring closure mechanism with 165°F fusible link

OPTIONS

Type 304 Stainless Steel Construction
 (Sleeve and in-airstream parts only)
 Sleeve of various depths and gauges
 Round or oval transitions
 212°F fusible link
 Dual Position Indication Package (see Notes)

NOTES


- "A" width and "B" height are opening dimensions. Dampers are provided ¼" undercut.
- Optional auxiliary blade position indication switches are rated at 11A, 1/3HP, 125VAC. These snap action switches are intended to make or break a circuit and will not provide variable or proportional resistance.
- See SI-SSFD for information regarding Stainless Steel Fire Dampers.

DAMPER SIZES

Orientation	Hor & Vert	2000 fpm, 4 in.wg				4000 fpm, 4 in.wg
		Horizontal (floor)		Vertical (wall)		Hor & Vert
Panels	Min Panel	Max Single Panel	Max Assy Panel	Max Single Panel	Max Assy Panel	Max Single Panel
Rectangular	4"W x 4"H (8"W x 8"H frame)	36"W x 48"H	72"W x 48"H	36"W x 48"H	72"W x 60"H 126"W x 48"H	36"W x 48"H
Round	6" dia. (8"W x 8"H frame)	34" dia.	46" dia.	34" dia.	58" dia.	34" dia.
Oval	6"W x 6"H (8"W x 8"H frame)	34"W x 46"H	70"W x 46"H	34"W x 46"H	70"W x 58"H 124"W x 46"H	34"W x 46"H

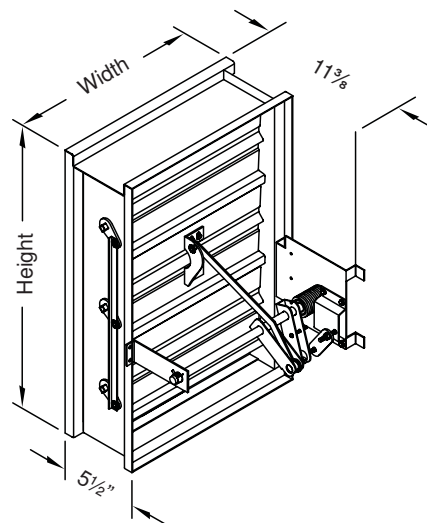
UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC FIRE DAMPER
 FIRE RESISTANCE RATING 1½ HR
 IN ACCORDANCE WITH UL-555
 SEE U.L. FIRE RESISTANCE DIRECTORY

abi air balance **FILE #R4708**



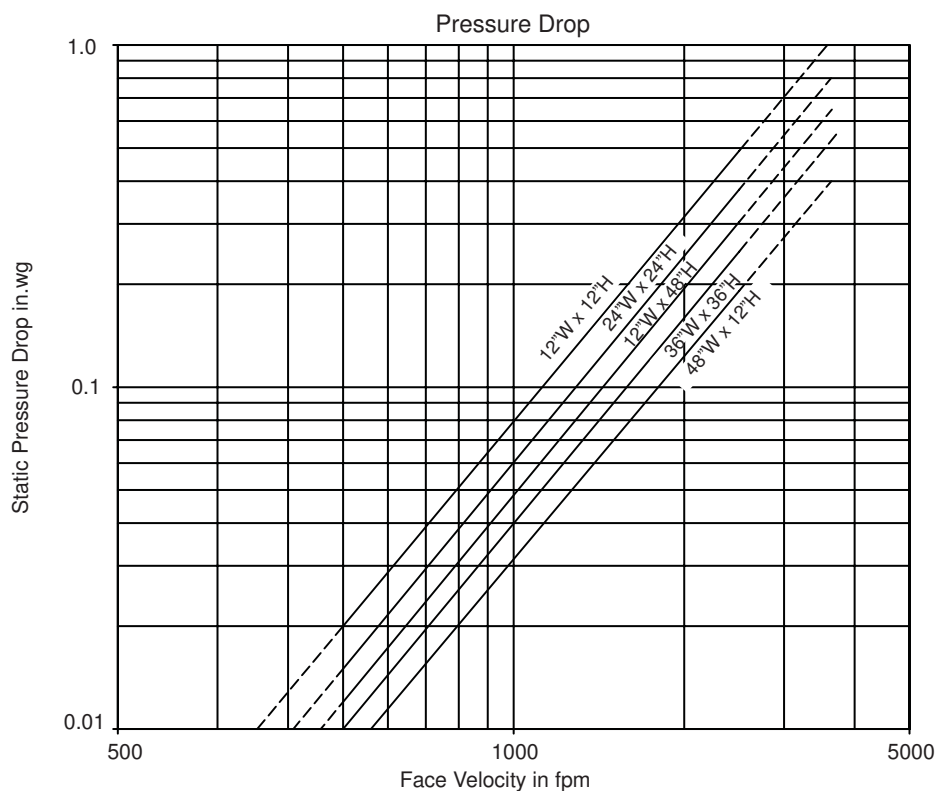
This fire damper meets the construction and performance requirements of

- Underwriters Laboratories Inc. Standards 555
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.



MODEL MD19

Non-Motorized • Single Thickness Blade • 1½ Hour • Dynamically Rated • UL Classified Fire Damper



Typical Performance Curve
 Tested per AMCA Standard 500-D; Figure 5.3 (In-Duct Mount)
 (Smaller sizes will have higher pressure drops.)

air balance

Dampers  Louvers
 UL Life Safety Products
 Division of Mestek
 Member of AMCA

MODEL MA19

Non-Motorized • Airfoil Blade • 1½ Hour • Dynamically Rated • UL Classified Fire Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 5½" x 7⁄8" x 16-GA galvanized steel hat channel
BLADES: 20-GA double skinned galvanized steel (equal to 14-GA), parallel action
AXLES: Square, plated solid steel stub
BEARINGS: Oil impregnated bronze
LINKAGE: Plated steel angle and crank plates with stainless steel pivots, in-jamb type
STOPS: 18-GA galvanized steel at head and sill
JAMB SEALS: Stainless steel
ACTUATOR: Non-motorized spring closure mechanism with 165°F fusible link
FINISH: Mill

OPTIONS

Sleeve of various depths and gauges
 Round or oval transitions
 212°F fusible link

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided approximately ¼" undersize.
2. Approved for vertical and horizontal installations.
3. Optional auxiliary blade position indication switches are rated at 11A, 1/3HP, 125VAC. These snap action switches are intended to make or break a circuit and will not provide variable or proportional resistance.

DAMPER SIZES

		2000 fpm, 4 in.wg		4000 fpm, 4 in.wg
Orientation	Hor and Vert	Horizontal and Vertical		Hor and Vert
Panels	Min Panel	Max Single Panel	Max Assy Panel	Max Single Panel
Rectangular	4"W x 4"H (8"W x 8"H frame)	32"W x 48"H	64"W x 36"H 32"W x 72"H	32"W x 36"H
Round	6" dia. (8"W x 8"H frame)	30" dia.	34" dia.	30" dia.
Oval	6"W x 6"H (8"W x 8"H frame)	30"W x 46"H	62"W x 34"H 30"W x 70"H	30"W x 34"H

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED DYNAMIC FIRE DAMPER

FIRE RESISTANCE RATING 1½ HR

IN ACCORDANCE WITH UL-555

SEE U.L. FIRE RESISTANCE DIRECTORY

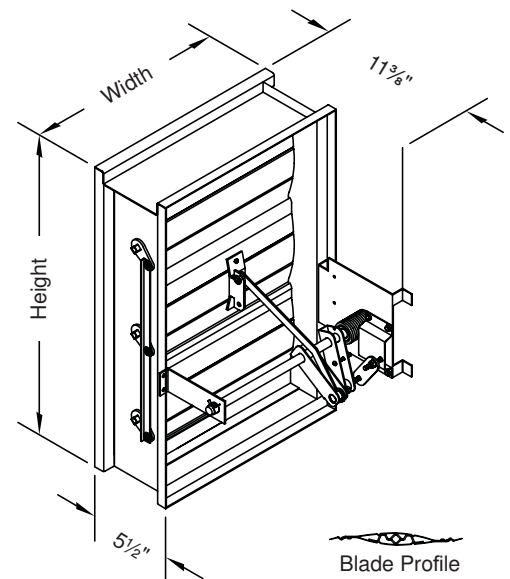
abi air balance

FILE #R4708



This fire damper meets the construction and performance requirements of

- Underwriters Laboratories Inc. Standards 555
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.



MODEL MA19

Non-Motorized • Airfoil Blade • 1½ Hour • Dynamically Rated • UL Classified Fire Damper

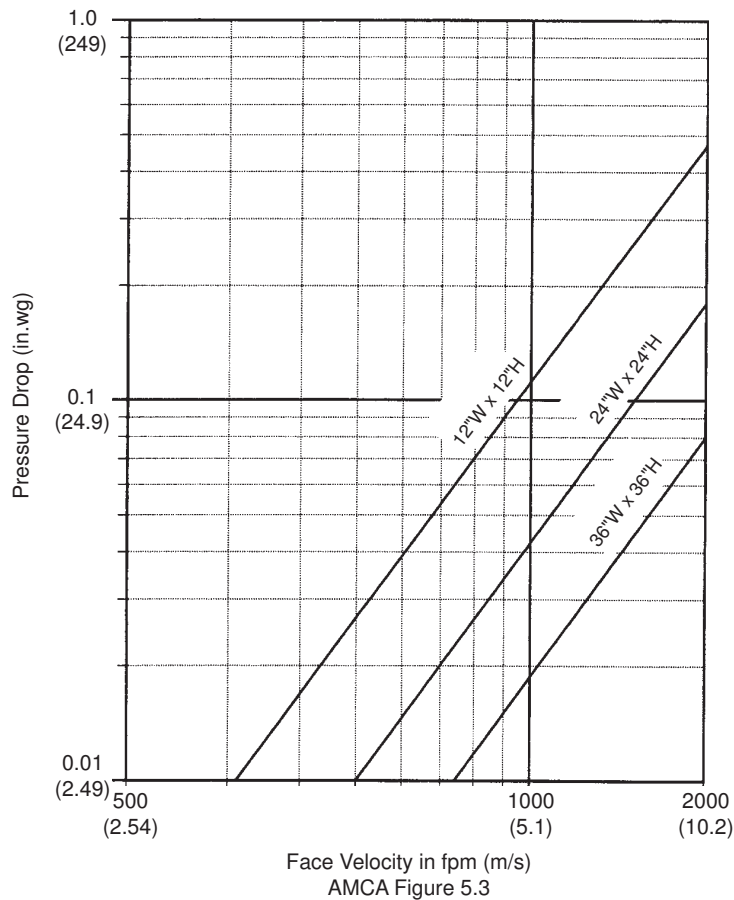
Operations Rating:

Maximum Differential Pressure: 4 in.wg

Maximum Velocity: 2000 fpm (4000 fpm through 32"W x 36"H)

Pressure Drop Rating:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with AMCA
Standard 555.

MODEL 319

4 7/8" Deep • 3 Hour • Vertical or Horizontal Mount • Static Fire Damper

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 22-GA galvanized steel, one-piece rollformed**BLADE:** 22-GA galvanized steel, curtain type**FUSIBLE LINK:** UL-Listed 165°F; Replaceable**CLOSURE SPRINGS:** Horizontal Models - Heat-treated Type 301 stainless steel constant force coiled negator type**FINISH:** Mill**UNDERWRITERS LABORATORIES, INC.®****CLASSIFIED STATIC FIRE DAMPERS****FIRE RESISTANCE RATING 3 HR.****abi** air balance inc.

FILE #R4708



This fire damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555
- National Fire Protection Association Standard 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:101
- Underwriters Laboratories Inc. Approved for dual direction airflow and static conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of 3 hours or more.

OPTIONS

212°F Replaceable Fusible Link

Factory-Supplied Sleeves (20-GA through 10-GA)

Type 304 Stainless Steel Construction

PK1202 Position Indicator Switch

B-Pan, Round, Oval, or Square Transitions

Multiple Panel Unit Assembly

Tab-Lock Retaining Angles

Perimeter Flange

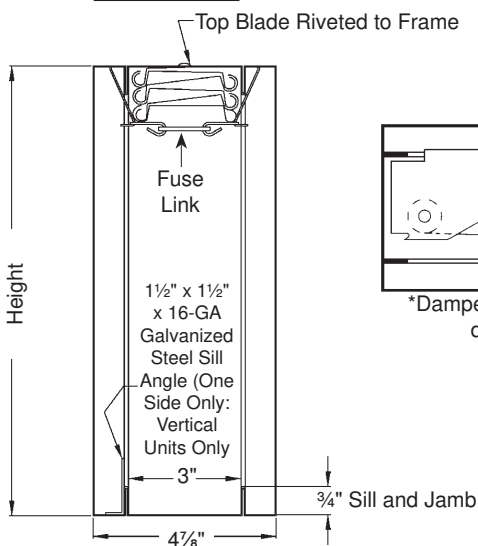
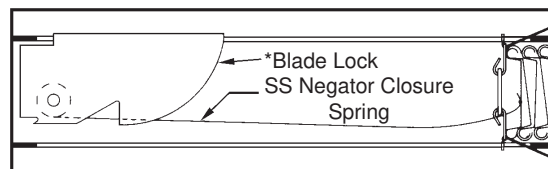
Pull Ring

NOTES

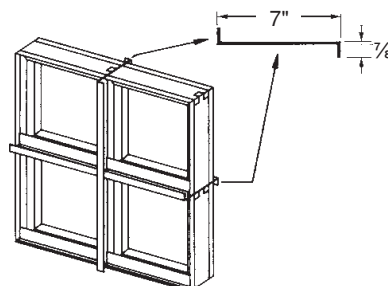
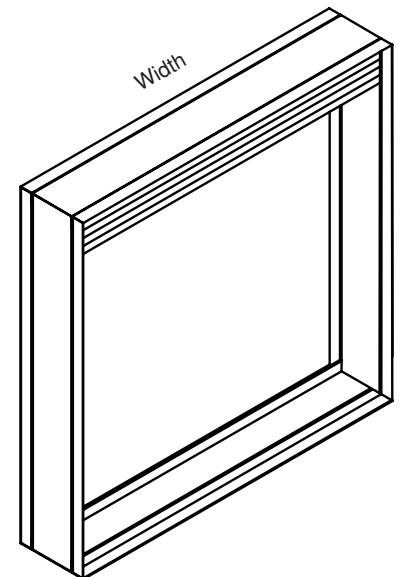
1. "A" width and "B" height are opening dimensions. Dampers are provided 1/4" undercut.
2. Unassembled multiple units do not include mullions.
3. 14-GA "Zee Mullion" along with a minimum 9" sleeve is required for all 319 Multiple Panel Vertical Mount Dampers.
4. See SI-SSFD for information regarding Stainless Steel Fire Damper sizes.

DAMPER SIZES

Orientation	Hor & Ver	Horizontal (floor)		Vertical (wall)	
Panels	Min Panel	Max Single Panel	Max Assy Panel	Max Single Panel	Max Assy Panel
319A	4"W x 4"H	48"W x 48"H	72"W x 36"W (36"W x 36"H each section)	36"W x 36"H	72"W x 72"W (36"W x 36"H each section)
319B	4"W x 3"H (duct) (4"W x 5"H frame)	48"W x 43"H (duct) (48"W x 48"H frame)	72"W x 32"H (duct) (72"W x 36"H frame) (36"W x 32"H each section duct)	36"W x 32"H (duct) (36"W x 36"H frame)	72"W x 68"H (duct) (72"W x 72"H frame) (36"W x 32"H each section duct)
319C	4"W x 4"H (duct) (6"W x 7"H frame)	46"W x 42"H (duct) (48"W x 48"H frame)	70"W x 31"H (duct) (72"W x 36"H frame)	34"W x 31"H (duct) (36"W x 36"H frame)	70"W x 67"H (duct) (72"W x 72"H frame)

Vertical Mount**Horizontal Mount**

*Damper to be installed with blade lock points facing downward and with access from above

**Multiple Panel Assembly**

MODEL 319

4 7/8" Deep • 3 Hour • Vertical or Horizontal Mount • Static Fire Damper

Free Area (sq.ft.) 319A

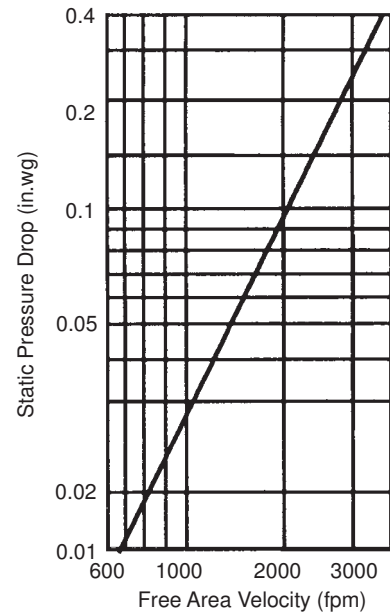
Vertical Mount

		Width											
Height		4	8	12	16	20	24	28	32	36	40	44	48
	4	.02	.06	.08	.13	.16	.20	.22	.26	.30	.33	.37	.40
	8	.08	.19	.32	.48	.59	.72	.85	1.0	1.2	1.3	1.4	1.5
	12	.16	.35	.60	.75	1.0	1.2	1.5	1.7	2.0	2.2	2.4	2.6
	16	.19	.52	.79	1.0	1.4	1.7	2.0	2.3	2.7	3.1	3.4	3.6
	20	.27	.65	1.0	1.4	1.9	2.1	2.6	3.0	3.5	4.0	4.5	4.8
	24	.33	.84	1.1	1.7	2.2	2.8	3.1	3.6	4.2	4.8	5.3	5.7
	28	.37	.95	1.4	2.0	2.6	3.2	4.0	4.4	5.0	5.9	6.4	6.9
	32	.45	1.1	1.7	2.2	3.0	4.0	4.7	5.1	5.7	6.5	7.2	7.8
	36	.49	1.2	2.0	2.6	3.5	4.5	5.2	6.0	7.1	7.7	8.1	8.9
	40	.54	1.4	2.3	3.0	4.0	5.0	6.0	6.8	7.9	8.7	9.0	10.0
	44	.58	1.6	2.5	3.3	4.4	5.4	6.6	7.7	8.5	9.5	10.2	11.1
	48	.64	1.7	2.7	3.8	5.0	6.0	6.9	8.0	9.3	10.6	11.3	12.5

Horizontal Mount

		Width											
Height		4	8	12	16	20	24	28	32	36	40	44	48
	4	.03	.09	.1	.2	.3	.3	.4	.4	.5	.6	.6	.7
	8	.1	.2	.4	.6	.7	.9	1.0	1.2	1.4	1.5	1.7	1.8
	12	.2	.4	.7	.9	1.2	1.5	1.8	2.0	2.3	2.6	2.8	3.1
	16	.2	.6	.9	1.3	1.7	2.0	2.4	2.8	3.1	3.5	3.9	4.2
	20	.3	.7	1.2	1.7	2.1	2.6	3.1	3.5	4.0	4.5	5.0	5.4
	24	.4	.9	1.4	2.0	2.6	3.2	3.7	4.3	4.9	5.4	6.0	6.6
	28	.4	1.0	1.7	2.4	3.0	3.7	4.4	5.0	5.7	6.4	7.0	7.7
	32	.5	1.2	2.0	2.7	3.5	4.3	5.1	5.8	6.6	7.4	8.2	9.0
	36	.5	1.3	2.2	3.1	4.0	4.8	5.7	6.6	7.4	8.4	9.2	10.1
	40	.6	1.5	2.5	3.5	4.4	5.4	6.4	7.4	8.4	9.3	10.3	11.3
	44	.6	1.7	2.7	3.8	4.9	6.0	7.0	8.1	9.2	10.3	11.4	12.4
	48	.7	1.8	3.0	4.2	5.4	6.6	7.7	8.9	10.1	11.3	12.5	13.7

Pressure Drop



$$\text{Free Area Velocity (fpm)} = \frac{\text{Flow (cfm)}}{\text{Free Area (sq.ft.)}}$$

For Free Area and Pressure Drop information for the B-Pan Transition, see SI-BPAN.

For Free Area and Pressure Drop information for the Round, Oval or Square Transition, see SI-TRFD.

In the interest of product development, Air Balance reserves the right to make changes without notice.

P.O. Box 606 • 7435 Industrial Rd. • Florence, KY 41042 • Phone: (859) 538-3400 • Fax: (859) 647-7810

MODEL D394 $\frac{7}{8}$ " Deep • 3 Hour • Vertical or Horizontal Mount • Dynamic Fire Damper**STANDARD MATERIALS AND CONSTRUCTION****FRAME:** 22-GA galvanized steel, one-piece rollformed**BLADE:** 22-GA galvanized steel, curtain type**FUSIBLE LINK:** UL-Listed 165°F; Replaceable**CLOSURE SPRINGS:** Heat-treated Type 301 stainless steel constant force coiled negator type**FINISH:** Mill**UNDERWRITERS LABORATORIES INC.®**

CLASSIFIED DYNAMIC FIRE DAMPER

FIRE RESISTANCE RATING 3 HR

abi air balance

FILE #R4708

**OPTIONS**

212°F Replaceable Fusible Link (Vertical Mount Only)

Factory-Supplied Sleeves (20-GA through 10-GA)

PK1202 Position Indicator Switch

B-Pan, Round, Oval, or Square Transitions

Tab-Lock Retaining Angles

Perimeter Flange

Pull Ring

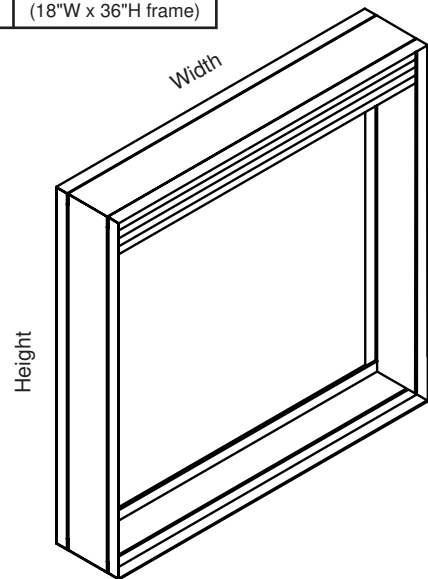
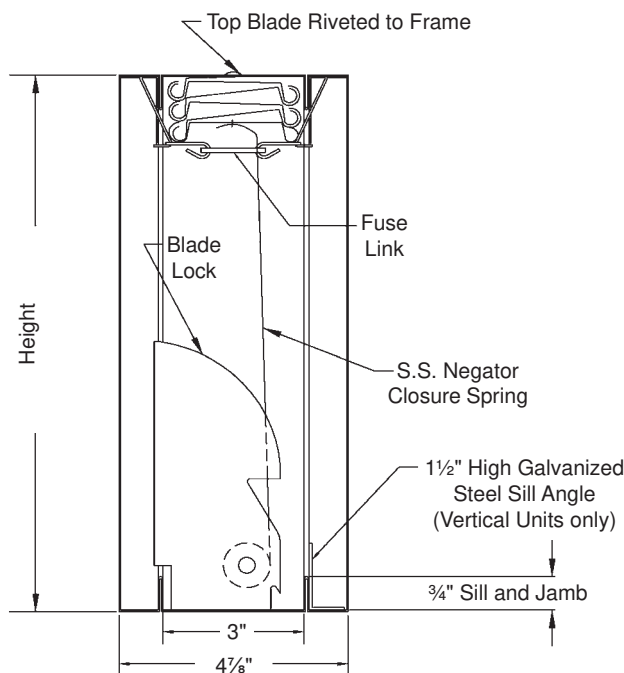
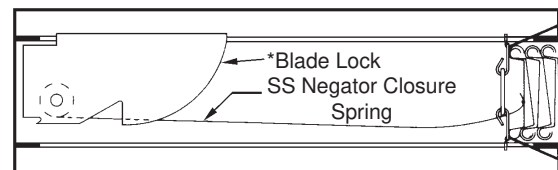
NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided 1/4" undercut.

DAMPER SIZES

Orientation	Hor & Ver	2000 fpm, 4 in.wg			4000 fpm, 4 in.wg
		Horizontal (floor)	Vertical (wall)		Vertical (wall)
Panels	Min Panel	Max Single Panel	Max Single Panel*	Max Assembly	Max Single Panel
D39A	4"W x 4"H	24"W x 24"H	36"W x 36"H	72"W x 36"H	18"W x 36"H
D39B	4"W x 3"H (duct) (4"W x 5"H frame)	24"W x 21"H (duct) (24"W x 24"H frame)	36"W x 32"H (duct) (36"W x 36"H frame)	72"W x 32"H (duct) (72"W x 36"H frame)	18"W x 32"H (duct) (18"W x 36"H frame)
D39C	4"W x 4"H (duct) (6"W x 7"H frame)	22"W x 20"H (duct) (24"W x 24"H frame)	34"W x 31"H (duct) (36"W x 36"H frame)	70"W x 31"H (duct) (72"W x 36"H frame)	16"W x 31"H (duct) (18"W x 36"H frame)

*Dampers greater than 36"W have a maximum single panel size of 18"W.

Vertical Mount**Horizontal Mount**

*Damper to be installed with blade lock points facing downward and with access from above

MODEL D39

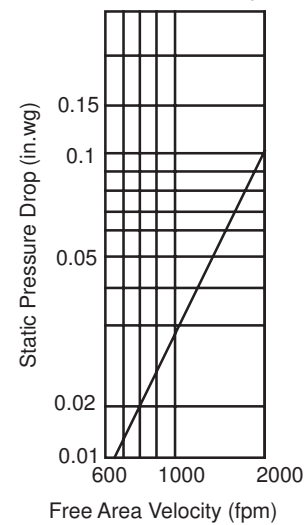
4 7/8" Deep • 3 Hour • Vertical or Horizontal Mount • Dynamic Fire Damper

Free Area D39A

		Width							
Height		8	12	16	20	24	28	32	36
	8	.2	.3	.5	.6	.7	.8	1.0	1.2
	12	.4	.6	.8	1.0	1.2	1.5	1.7	2.0
	16	.5	.8	1.0	1.4	1.7	2.0	2.3	2.7
	20	.7	1.0	1.4	1.9	2.1	2.6	3.0	3.5
	24	.8	1.1	1.7	2.2	2.8	3.1	3.6	4.2
	28	1.0	1.4	2.0	2.6	3.2	4.0	4.4	5.0
	32	1.1	1.7	2.2	3.0	4.0	4.7	5.1	5.7
	36	1.2	2.0	2.6	3.5	4.5	5.2	6.0	7.1

$$\text{Free Area Velocity (fpm)} = \frac{\text{Flow (cfm)}}{\text{Free Area (sq.ft.)}}$$

Pressure Drop



For Free Area and Pressure Drop information for the B-Pan Transition, see SI-BPAN.
 For Free Area and Pressure Drop information for the Round, Oval, or Square Transition, see SI-TRFD.

MODEL MD39

Non-Motorized • Single Thickness Blade • 3 Hour • Dynamically Rated • UL Classified Fire Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 5½" x 7⁄8" x 16-GA galvanized steel hat channel
BLADES: 16-GA galvanized steel, 6" nominal width, parallel action
AXLES: Square, plated solid steel stub
BEARINGS: Oil impregnated bronze
LINKAGE: Plated steel angle and crank plates with stainless steel pivots in-jamb type
STOPS: 18-GA galvanized steel at head and sill
JAMB SEALS: Stainless Steel
FINISH: Mill
ACTUATOR: Non-motorized spring closure mechanism with 165°F fusible link

OPTIONS

Sleeve of various depths (16" minimum) and gauges
 Round or oval transitions
 212°F fusible link
 Dual position indication package (see note #2.)

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided ¼" undercut.
2. Optional auxiliary blade position indication switches are rated at 11A, 1/3HP, 125VAC. These snap action switches are intended to make or break a circuit and will not provide variable or proportional resistance.

DAMPER SIZES

Orientation	Hor & Vert	2000 fpm, 4 in.wg				4000 fpm, 4 in.wg	
		Horizontal (floor)		Vertical (wall)		Horizontal (floor)	Vertical (wall)
Panels	Min Panel	Max Single Panel	Max Assy Panel	Max Single Panel	Max Assy Panel	Max Single Panel	Max Single Panel
Rectangular	4"W x 4"H (8"W x 8"H frame)	30"W x 48"H 36"W x 30"H	60"W x 48"H	36"W x 48"H	126"W x 48"H	30"W x 48"H 36"W x 30"H	36"W x 48"H
Round	6" dia. (8"W x 8"H frame)	28" dia.	46" dia.	34" dia.	46" dia.	28" dia.	34" dia.
Oval	6"W x 6"H (8"W x 8"H frame)	28"W x 46"H 34"W x 28"H	58"W x 46"H	34"W x 46"H	124"W x 46"H	28"W x 46"H 34"W x 28"H	34"W x 46"H

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED DYNAMIC FIRE DAMPER

FIRE RESISTANCE RATING 3 HR

IN ACCORDANCE WITH UL-555

SEE U.L. FIRE RESISTANCE DIRECTORY

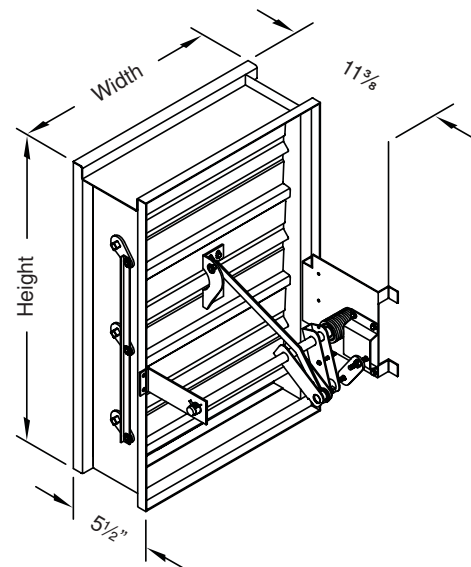
abi air balance

FILE #R4708



This fire damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of 3 hours or more.

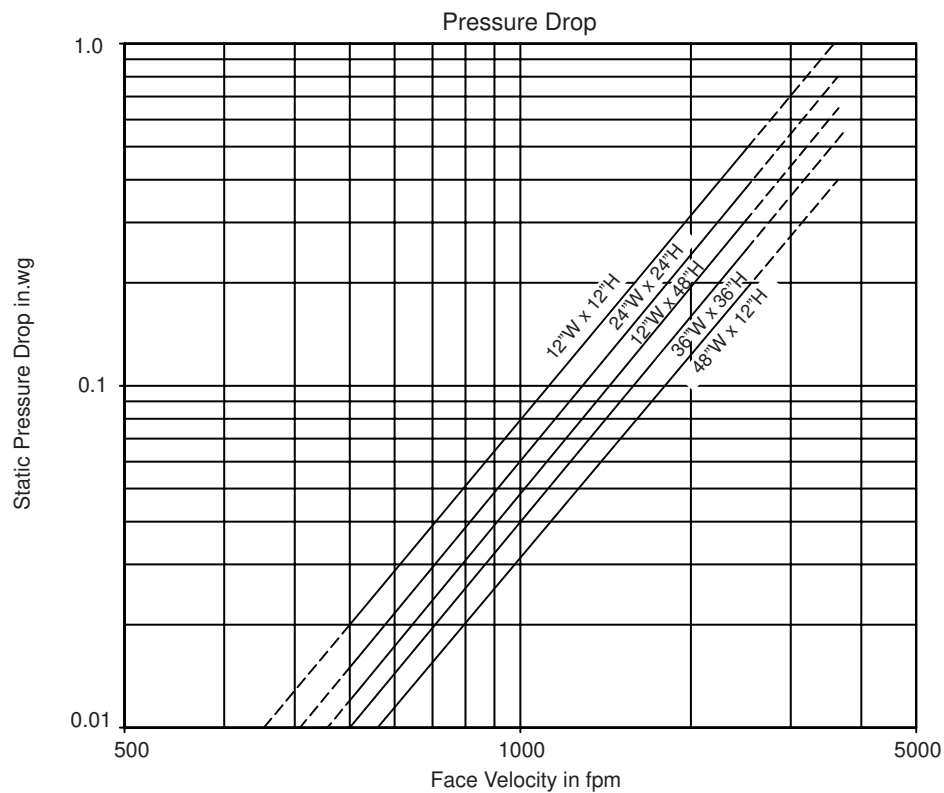


air balance

Dampers Louvers
 UL Life Safety Products
 Division of Mestek
 Member of AMCA

MODEL MD39

Non-Motorized • Single Thickness Blade • 3 Hour • Dynamically Rated • UL Classified Fire Damper



Typical Performance Curve
 Tested per AMCA Standard 500-D; Figure 5.3 (In-Duct Mount)
 (Smaller sizes will have higher pressure drops.)

air balance

Dampers  Louvers
 UL Life Safety Products
 Division of Mestek
 Member of AMCA

MODEL MA39

Non-Motorized • Airfoil Blade • 3 Hour • Dynamically Rated • UL Classified Fire Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7⁄8" x 16-GA galvanized steel hat channel
BLADES: 20-GA double skinned galvanized steel (equal to 14-GA), parallel action
AXLES: Square, plated solid steel stub
BEARINGS: Oil impregnated bronze
LINKAGE: Plated steel angle and crank plates with stainless steel pivots, in-jamb type
STOPS: 18-GA galvanized steel at head and sill
JAMB SEALS: Stainless steel
ACTUATOR: Non-motorized spring closure mechanism with 165°F fusible link
FINISH: Mill

OPTIONS

Sleeve of various depths and gauges
 Round or oval transitions
 212°F fusible link

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided approximately ¼" undersize.
2. Approved for vertical and horizontal installations.
3. Optional auxiliary blade position indication switches are rated at 11A, 1/3HP, 125VAC. These snap action switches are intended to make or break a circuit and will not provide variable or proportional resistance.

DAMPER SIZES

Orientation	Hor or Vert	2000 fpm 4.0 in.wg		4000 fpm 4.0 in.wg
		Horizontal or Vertical		Hor or Vert
Panels	Minimum Panel	Maximum Panel	Max Assy Panel	Maximum Panel
Rectangular	4"W x 4"H (8"W x 8"H frame)	30"W x 48"H	60"W x 36"H	30"W x 36"H
Round	6" dia. (8"W x 8"H frame)	28" dia.	34" dia.	28" dia.
Oval	6"W x 6"H (8"W x 8"H frame)	28"W x 46"H	58"W x 34"H	28"W x 34"H

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED DYNAMIC FIRE DAMPER

FIRE RESISTANCE RATING 3 HR

IN ACCORDANCE WITH UL-555

SEE U.L. FIRE RESISTANCE DIRECTORY

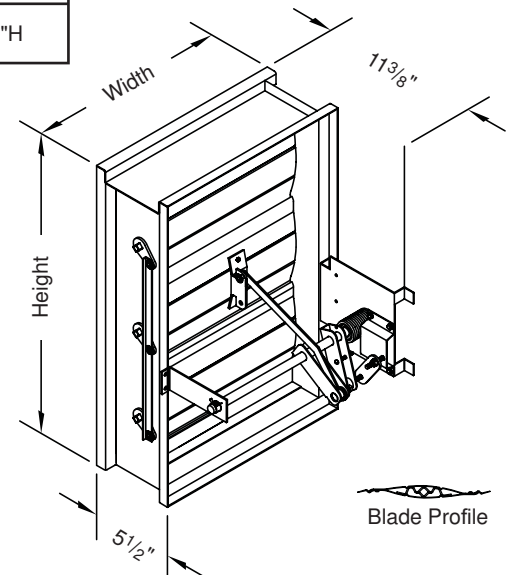
abi air balance

FILE #R4708



This fire damper meets the construction and performance requirements of

- Underwriters Laboratories Inc. Standards 555
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of 3 hours or more.



MODEL MA39

Non-Motorized • Airfoil Blade • 3 Hour • Dynamically Rated • UL Classified Fire Damper

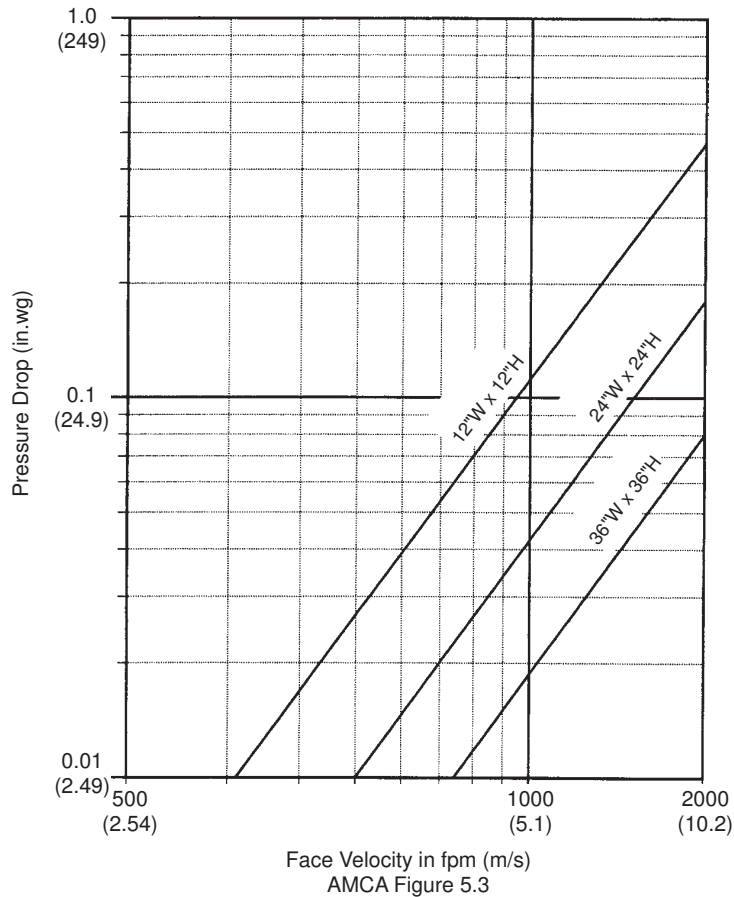
Operations Rating:

Maximum Differential Pressure: 4 in.wg

Maximum Velocity: 2000 fpm (4000 fpm through 30"W x 36"H)

Pressure Drop Rating:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with AMCA
Standard 555.

B-Pan Transition

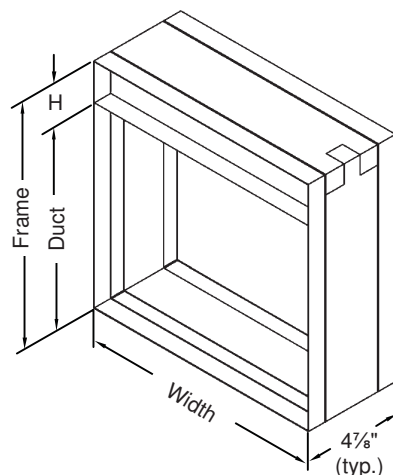
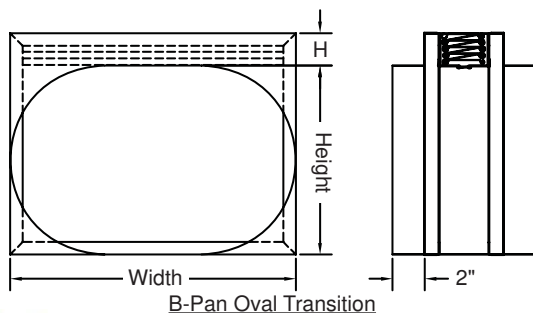
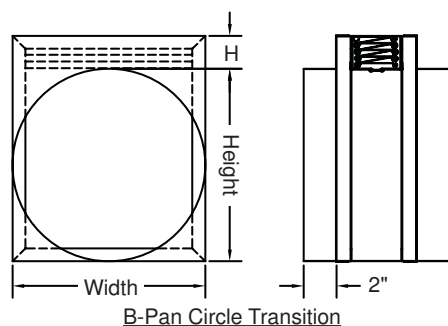
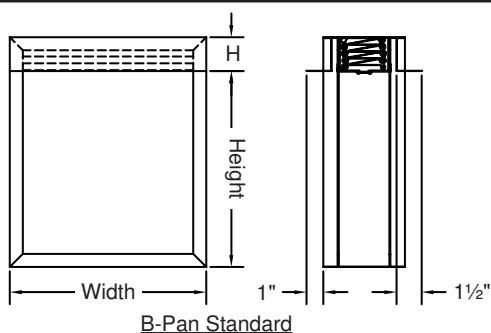
Galvanized Steel Fire Damper Models: 119, D19, 319, D39

APPLICATION

The B-Pan transition allows the blades to be out of air stream. The B-Pan transition also used for dampers less than the minimum frame size. Reference SI-SSFD for Stainless Steel construction sizes.

PANEL SIZE LIMITATIONS

			2000 fpm, 4 in.wg (D19 and D39 only)				4000 fpm, 4 in.wg
Orientation	Hor & Vert	Horizontal		Vertical		Vertical Only	
Panel	Minimum Panel	Maximum Single Panel	Maximum Assembly	Maximum Single Panel	Maximum Assembly	Maximum Single Panel	
Model	119B	4"W x 3"H (duct) (4"W x 5"H frame)	48"W x 43"H (duct) (48"W x 48"H frame)	102"W x 43"H (duct) (102"W x 48"H frame) (36"W x 43"H section duct)	60"W x 55"H (duct) (60"W x 60"H frame)	120"W x 115"H (duct) (120"W x 120"H frame) (40"W x 60"H section duct)	not available
	319B	4"W x 3"H (duct) (4"W x 5"H frame)	48"W x 43"H (duct) (48"W x 48"H frame)	72"W x 32"H (duct) (72"W x 36"H frame) (36"W x 32"H section duct)	36"W x 32"H (duct) (36"W x 36"H frame)	72"W x 68"H (duct) (72"W x 72"H frame) (36"W x 32"H section duct)	not available
	D19B	4"W x 3"H (duct) (4"W x 5"H frame)	24"W x 21"H (duct) (24"W x 24"H frame)	not available	36"W x 32"H (duct) (36"W x 36"H frame)	72"W x 32"H (duct) (72"W x 36"H frame) (18"W x 32"H section duct)	18"W x 32"H (duct) (18"W x 36"H frame)
	D39B	4"W x 3"H (duct) (4"W x 5"H frame)	24"W x 21"H (duct) (24"W x 24"H frame)	not available	36"W x 32"H (duct) (36"W x 36"H frame)	72"W x 32"H (duct) (72"W x 36"H frame) (18"W x 32"H section duct)	18"W x 32"H (duct) (18"W x 36"H frame)



Head Sizing Chart 119, 319H, D19, D39		Head Sizing Chart 319V	
Duct Height	Head Height "H"	Duct Height	Head Height "H"
3" - 18"	2"	3" - 18"	2"
19" - 28"	3"	19" - 28"	3"
29" - 40"	4"	29" - 32"	4"
41" - 55"	5"	33" - 37"	2"
56" - 57"	3"	38" - 57"	3"
58" - 84"	4"	58" - 68"	4"
85" - 115"	5"		

B-Pan Transition

Galvanized Steel Fire Damper Models: 119, D19, 319, D39

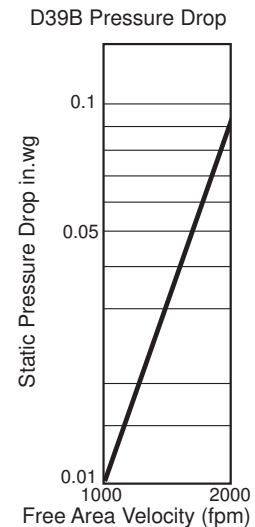
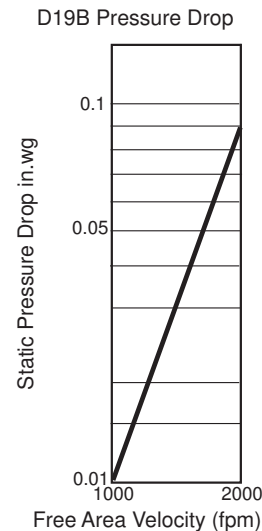
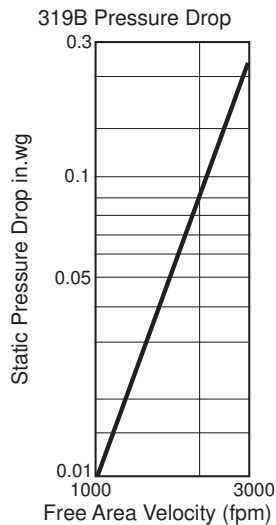
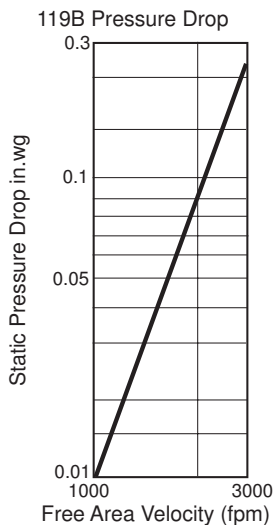
119B Free Area																
Duct Height	Duct Width															
		4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	4	.06	.2	.3	.4	.5	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3	1.4
	8	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4	2.5	2.8	3.0
	12	.2	.5	.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.4	3.7	4.0	4.3	4.6
	16	.3	.7	1.2	1.6	2.0	2.4	2.8	3.3	3.7	4.1	4.5	5.0	5.4	5.8	6.2
	20	.4	.9	1.4	2.0	2.5	3.0	3.6	4.1	4.7	5.2	5.7	6.3	6.8	7.3	7.9
	24	.4	1.1	1.7	2.4	3.0	3.7	4.3	5.0	5.6	6.3	6.9	7.5	8.2	8.8	9.5
	28	.5	1.2	2.0	2.8	3.5	4.3	5.0	5.8	6.5	7.3	8.0	8.8	9.5	10.3	11.0
	32	.6	1.5	2.3	3.2	4.0	4.9	5.8	6.7	7.5	8.4	9.3	10.1	11.0	11.9	12.7
	36	.7	1.6	2.6	3.6	4.6	5.5	6.5	7.5	8.5	9.5	10.4	11.4	12.4	13.4	14.4
	40	.7	1.8	2.9	4.0	5.1	6.2	7.3	8.4	9.4	10.5	11.6	12.7	13.8	14.9	16.0
	44	.8	2.0	3.2	4.4	5.6	6.8	8.0	9.2	10.4	11.6	12.8	14.0	15.2	16.4	17.6
	48	.8	2.1	3.3	4.6	5.9	7.1	8.4	9.6	10.9	12.1	13.4	14.7	15.9	17.2	18.4
	52	.9	2.4	3.8	5.2	6.6	8.0	9.5	10.9	12.3	13.7	15.2	16.6	18.0	19.4	20.9
	55	.9	2.4	3.9	5.3	6.8	8.3	9.8	11.3	12.8	14.3	15.8	17.3	18.8	20.3	21.8

D19B Free Area												
Duct Height	Duct Width											
		8	12	16	20	24	28	32	36			
	8	.4	.6	.8	1.0	1.2	1.4	1.6	1.8			
	12	.5	.9	1.2	1.5	1.8	2.1	2.4	2.7			
	16	.7	1.2	1.6	2.0	2.4	2.8	3.3	3.7			
	20	.9	1.4	2.0	2.5	3.0	3.6	4.1	4.7			
	24	1.1	1.7	2.4	3.0	3.7	4.3	5.0	5.6			
	28	1.2	2.0	2.8	3.5	4.3	5.0	5.8	6.5			
	32	1.5	2.3	3.2	4.0	4.9	5.8	6.7	7.5			

D39B Free Area												
Duct Height	Duct Width											
		8	12	16	20	24	28	32	36			
	8	.27	.44	.62	.79	.97	1.1	1.3	1.5			
	12	.44	.73	1.0	1.3	1.6	1.9	2.1	2.4			
	16	.62	1.1	1.4	1.8	2.2	2.6	3.0	3.4			
	20	.79	1.3	1.8	2.3	2.8	3.3	3.8	4.3			
	24	.97	1.6	2.2	2.8	3.4	4.1	4.7	5.3			
	28	1.1	1.9	2.6	3.3	4.1	4.8	5.5	6.2			
	32	1.3	2.1	3.0	3.8	4.7	5.5	6.3	7.2			

319B Free Area (Vertical Mount)													
Duct Height	Duct Width												
		4	8	12	16	20	24	28	32	36	40	44	47
	4	.04	.09	.16	.22	.29	.35	.41	.47	.54	.58	.64	.70
	8	.09	.27	.44	.62	.79	.97	1.1	1.3	1.5	1.6	1.8	1.9
	12	.16	.44	.73	1.0	1.3	1.6	1.9	2.1	2.4	2.6	2.9	3.2
	16	.22	.62	1.0	1.4	1.8	2.2	2.6	3.0	3.4	3.7	4.1	4.4
	20	.29	.79	1.3	1.8	2.3	2.8	3.3	3.8	4.3	4.7	5.2	5.7
	24	.35	.97	1.6	2.2	2.8	3.4	4.1	4.7	5.3	5.8	6.4	6.9
	28	.41	1.1	1.9	2.6	3.3	4.1	4.8	5.5	6.2	6.8	7.5	8.2
	32	.47	1.3	2.1	3.0	3.8	4.7	5.5	6.3	7.2	7.8	8.7	9.4
	36	.51	1.4	2.3	3.2	4.2	5.0	5.9	6.8	7.7	8.6	9.4	10.2
	40	.58	1.6	2.6	3.6	4.6	5.7	6.6	7.7	8.7	9.5	10.5	11.4
	42	.61	1.7	2.8	3.8	5.0	6.1	7.2	8.3	9.3	10.2	11.3	12.3

319B Free Area (Horizontal Mount)															
Duct Height	Duct Width														
		4	8	12	16	20	24	28	32	36	40	44	48		
	4	.06	.2	.3	.4	.5	.5	.6	.7	.8	.9	1.0	1.1		
	8	.2	.4	.6	.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4		
	12	.2	.5	.9	1.2	1.5	1.8	2.1	2.4	2.7	3.0	3.4	3.7		
	16	.3	.7	1.2	1.6	2.0	2.4	2.8	3.3	3.7	4.1	4.5	5.0		
	20	.4	.9	1.4	2.0	2.5	3.0	3.6	4.1	4.7	5.2	5.7	6.3		
	24	.4	1.1	1.7	2.4	3.0	3.7	4.3	5.0	5.6	6.3	6.9	7.5		
	28	.5	1.2	2.0	2.8	3.5	4.3	5.0	5.8	6.5	7.3	8.0	8.8		
	32	.6	1.5	2.3	3.2	4.0	4.9	5.8	6.7	7.5	8.4	9.3	10.1		
	36	.7	1.6	2.6	3.6	4.6	5.5	6.5	7.5	8.5	9.5	10.4	11.4		
	40	.7	1.8	2.9	4.0	5.1	6.2	7.3	8.4	9.4	10.5	11.6	12.7		
	43	.7	1.9	3.0	4.1	5.3	6.5	7.6	8.8	9.9	11.1	12.3	13.4		



Transition - Round, Oval, or Square

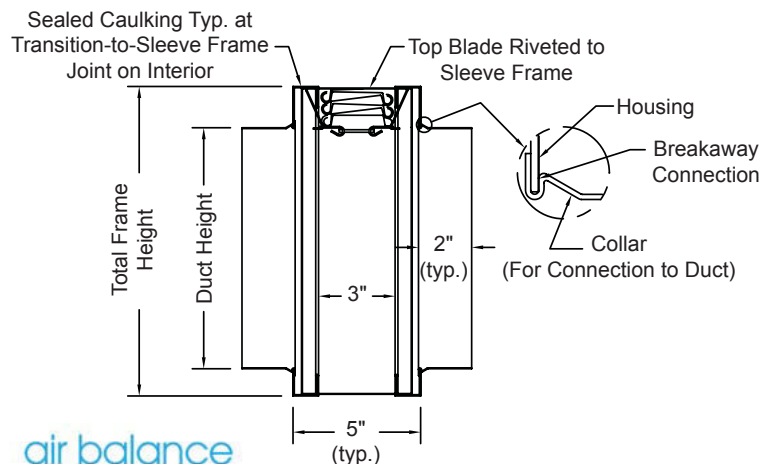
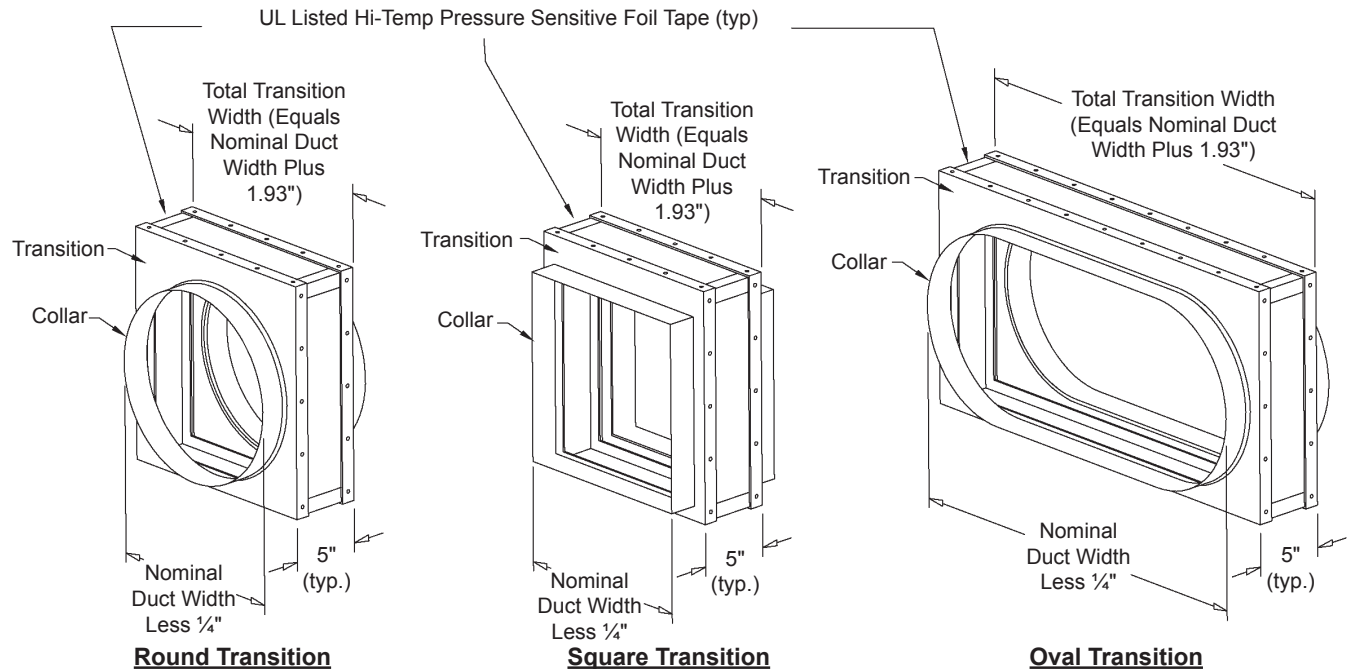
Galvanized Steel Fire Damper Models: 119, D19, 319, D39

APPLICATION

By having a transition on the fire damper, it allows 100% free area. The transition can also allow for smaller duct work than the frame size. The transition can be used to mount into round or oval duct work. Reference SI-SSFD for Stainless Steel construction sizes.

PANEL SIZE LIMITATIONS

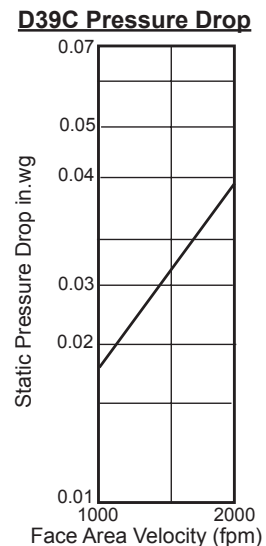
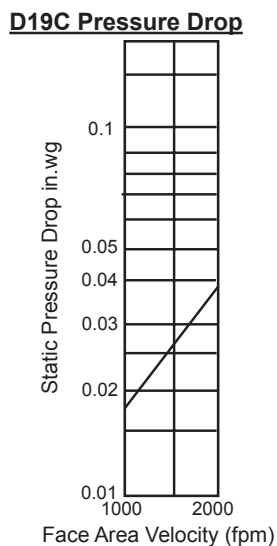
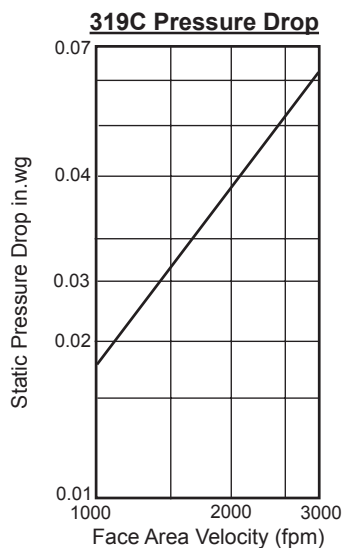
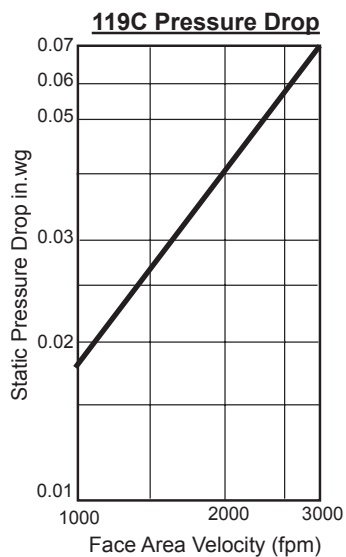
			2000 fpm, 4 in.wg (D19C and D39C only)				4000 fpm, 4 in.wg
Orientation		Hor & Vert	Horizontal		Vertical		Vertical Only
Panel		Minimum Panel	Maximum Single Panel	Maximum Assembly	Maximum Single Panel	Maximum Assembly	Maximum Single Panel
Model	119C	4"W x 4"H (duct) (6"W x 7"H frame)	46"W x 42"H (duct) (48"W x 48"H frame)	100"W x 42"H (duct) (102"W x 48"H frame)	58"W x 54"H (duct) (60"W x 60"H frame)	118"W x 114"H (duct) (120"W x 120"H frame)	not available
	319C	4"W x 4"H (duct) (6"W x 7"H frame)	46"W x 42"H (duct) (48"W x 48"H frame)	70"W x 31"H (duct) (72"W x 36"H frame)	34"W x 31"H (duct) (36"W x 36"H frame)	70"W x 67"H (duct) (72"W x 72"H frame)	not available
	D19C	4"W x 4"H (duct) (6"W x 7"H frame)	22"W x 20"H (duct) (24"W x 24"H frame)	not available	34"W x 31"H (duct) (36"W x 36"H frame)	70"W x 31"H (duct) (72"W x 36"H frame)	16"W x 31"H (duct) (18"W x 36"H frame)
	D39C	4"W x 4"H (duct) (6"W x 7"H frame)	22"W x 20"H (duct) (24"W x 24"H frame)	not available	34"W x 31"H (duct) (36"W x 36"H frame)	70"W x 31"H (duct) (72"W x 36"H frame)	16"W x 31"H (duct) (18"W x 36"H frame)



Sizing Chart			
Width Size (119, 319, D19, D39)		Duct Width	Add for Frame Width
		4" - 120"	2"
Height Sizing Chart (119, 319H, D19, D39)		Height Sizing Chart (319V)	
Duct Height	Add for Frame Height	Duct Height	Add for Frame Height
4" - 18"	3"	4" - 18"	3"
19" - 28"	4"	19" - 28"	4"
29" - 40"	5"	29" - 31"	5"
41" - 54"	6"	32" - 36"	3"
55" - 57"	4"	37" - 60"	4"
58" - 84"	5"	61" - 67"	5"
85" - 114"	6"		

Transition - Round, Oval, or Square

Galvanized Steel Fire Damper Models: 119, D19, 319, D39



With 100% Free Area, Pressure Drop is determined by FACE Area Velocity (in lieu of Free Area Velocity).

$$\text{Face Area Velocity (fpm)} = \frac{\text{Flow (cfm)}}{\text{Face Area (sq.ft.)}}$$

X-Style Sleeve

Galvanized Steel Fire Damper

Models: 119, D19, 319, D39

APPLICATION

The X-Style Sleeve is an integral sleeve frame. The sleeve length comes in 2 depths, 12" and 14". The integral sleeve frame comes in three different styles. The "A" style is without any transition, and the blades are in the air stream (see also SD-119, SD-319, SD-D19 and SD-D39). The "B" style has a B-Pan so the blades are out of the airstream (see also SI-BPAN). The "C" style is with a round, oval, or square transition and has 100% Free Area (see also SI-TRFD).

PANEL SIZE LIMITATIONS

Orientation		Horizontal & Vertical	Horizontal	Vertical
Panel		Minimum Panel	Maximum Section	Maximum Section
Model	119X	A	4"W x 4"H	48"W x 48"H
		B	4"W x 3"H duct (4"W x 5"H frame)	48"W x 43"H duct (48"W x 48"H frame)
		C	4"W x 4"H duct (6"W x 7"H frame)	46"W x 42"H duct (48"W x 48"H frame)
	319X	A	4"W x 4"H	48"W x 48"H
		B	4"W x 3"H duct (4"W x 5"H frame)	48"W x 43"H duct (48"W x 48"H frame)
		C	4"W x 4"H duct (6"W x 7"H frame)	46"W x 42"H duct (48"W x 48"H frame)
	D19X	A	4"W x 4"H	24"W x 24"H
		B	4"W x 3"H duct (4"W x 5"H frame)	24"W x 21"H duct (24"W x 24"H frame)
		C	4"W x 4"H duct (6"W x 7"H frame)	22"W x 20"H duct (24"W x 24"H frame)
	D39X	A	4"W x 4"H	24"W x 24"H
		B	4"W x 3"H duct (4"W x 5"H frame)	24"W x 21"H duct (24"W x 24"H frame)
		C	4"W x 4"H duct (6"W x 7"H frame)	22"W x 20"H duct (24"W x 24"H frame)

STANDARD MATERIALS AND CONSTRUCTION

SLEEVE FRAME: 22-GA, one-piece rollformed galvanized steel

BLADE: 22-GA galvanized steel, curtain type

FUSIBLE LINK: UL-Listed 165°F; Replaceable

CLOSURE SPRINGS: All D19X and D39X and Horizontal Models 119X & 319X
Heat-treated Type 301 stainless steel constant force coiled negator type

FINISH: Mill

FOR "C" STYLE DAMPERS

TRANSITION CAPS: 20-GA galvanized steel, riveted to sleeve frame

DUCT COLLARS: 24-GA galvanized steel, crimped to transitions

OPTIONS

212°F Replaceable Fusible Link

PK1202 Position Indicator Switch

B-Pan, Round, Oval, or Square Transitions

Tab-Lock Retaining Angles

Perimeter Flange

Pull Ring

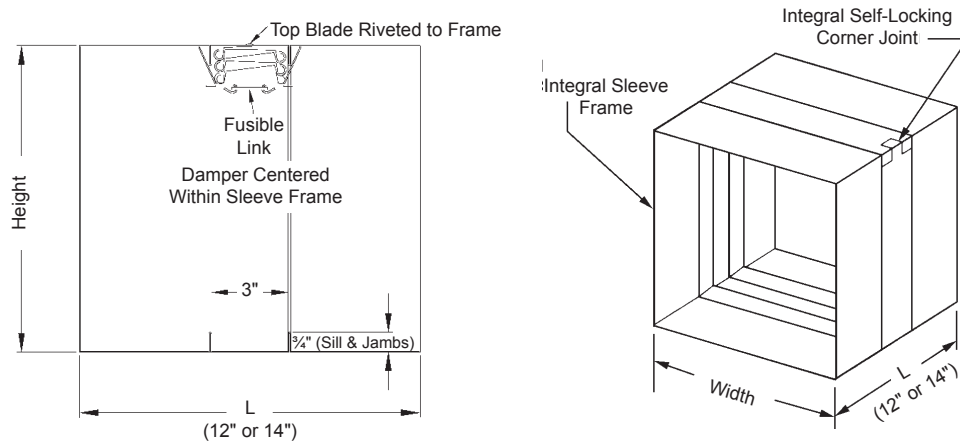
NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided ¼" undercut.

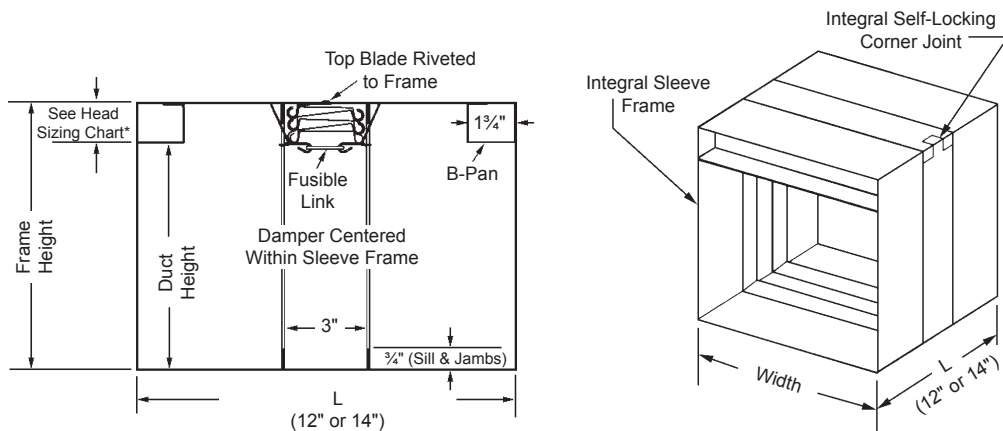
X-Style Sleeve

Galvanized Steel Fire Damper Models: 119, D19, 319, D39

"A" Style

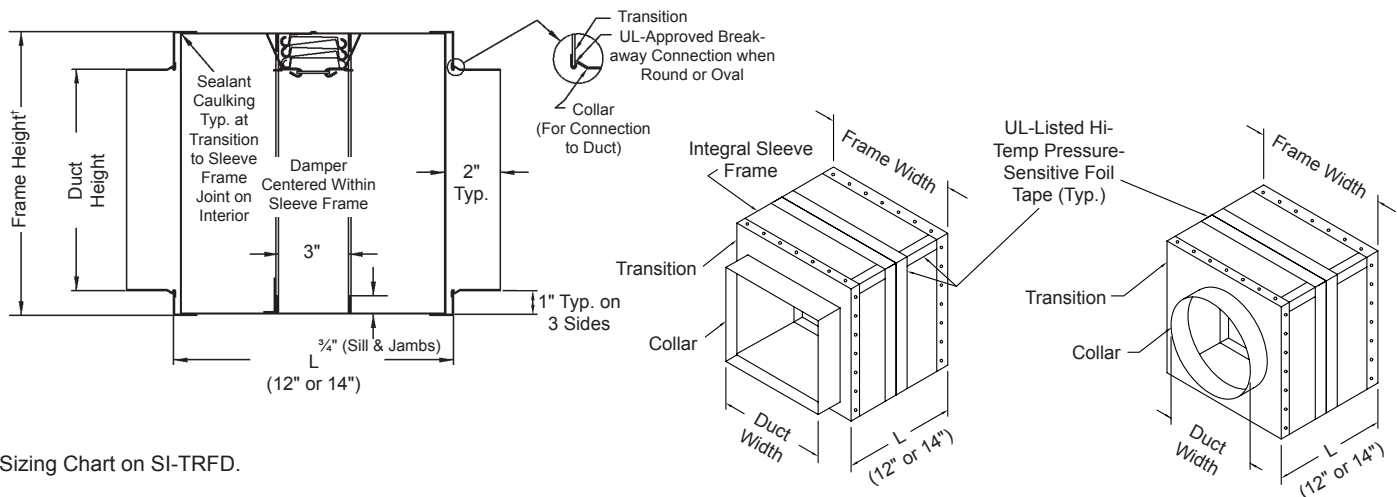


"B" Style (with B-Pan Transition for Blades Out of Airstream)



*Head Sizing Chart on SI-BPAN.

"C" Style (with Transition for 100% Free Area)



*Sizing Chart on SI-TRFD.

Stainless Steel

Fire Damper Models: 119, 319, MD19

APPLICATION

Stainless Steel 119 and 319 Fire Dampers are available for static installation in either a 1½ hour or 3 hour application. The 119 and 319 stainless steel dampers come in three different styles. The "A" style is without any transition, and the blades are in the air stream (see also SD-119 and SD-319). The "B" style has a B-Pan so the blades are out of the airstream (see also SI-BPAN). The "C" style is with a round, oval, or square transition and has 100% Free Area (see also SI-TRFD).

The MD19 is available in Stainless Steel construction for dynamic installation. The multi-blade fire dampers are available in a 1½ hour application (see SD-MD19).

PANEL SIZE LIMITATIONS

Orientation		Horizontal & Vertical	Horizontal		Vertical	
Panel		Minimum Panel	Maximum Single Section	Maximum Assy Panel	Maximum Single Section	Maximum Assy Panel
Model	119(SS) A	4"W x 4"H	48"W x 48"H	102"W x 48"H duct (36"W x 48"H each section)	60"W x 60"H duct	120"W x 120"H duct 40"W x 60"H (each section)
	119(SS) B	4"W x 3"H duct (4"W x 5"H frame)	48"W x 43"H duct (48"W x 48"H frame)	102"W x 43"H duct (102"W x 48"H frame) (36"W x 48"H each section)	60"W x 55"H duct (60"W x 60"H frame)	120"W x 115"H duct (120"W x 120"H frame) (40"W x 60"H each section)
	119(SS) C	4"W x 4"H duct (6"W x 7"H frame)	46"W x 42"H duct (48"W x 48"H frame)	100"W x 42"H duct (102"W x 48"H frame)	58"W x 54"H duct (60"W x 60"H frame)	118"W x 114"H duct (120"W x 120"H frame)
	319(SS) A	4"W x 4"H	N/A	N/A	47"W x 48"H	93"W x 48"H duct 46.5"W x 48"H (each panel)
	319(SS) B (Vertical only)	4"W x 3"H duct (4"W x 5"H frame)	N/A	N/A	47"W x 43"H duct (47"W x 48"H frame)	93"W x 43"H duct 46.5"W x 48"H (each panel)
	319(SS) C	4"W x 4"H duct (6"W x 7"H frame)	N/A	N/A	45"W x 42"H duct (47"W x 48"H frame)	91"W x 42"H duct 93"W x 48"H (frame)
MD19(SS) 2000 fpm, 4in.wg		8"W x 8"H	24"W x 24"H	N/A	36"W x 32"H	108"W x 32"H
MD19(SS) 4000 fpm, 4in.wg		8"W x 8"H	24"W x 24"H	N/A	36"W x 32"H	N/A

119 & 319

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 22-GA 304 stainless steel, one-piece rollformed

BLADE: 22-GA 304 stainless steel, curtain type

FUSIBLE LINK: UL-Listed 165°F; Replaceable

CLOSURE SPRINGS: Horizontal Models - Heat-treated Type 301 stainless steel constant force coiled negator type

FINISH: Mill

FOR "C" STYLE DAMPERS

TRANSITION CAPS: 304 stainless steel, riveted to sleeve frame

DUCT COLLARS: 304 stainless steel, crimped to transition

OPTIONS

212°F Replaceable Fusible Link

Factory-Supplied Sleeves (20-GA through 10-GA)

PK1202 Position Indicator Switch

B-Pan, Round, Oval, or Square Transitions

Multiple Panel Unit Assembly

Tab-Lock Retaining Angles (Galvanized Steel)

Perimeter Flange

Pull Ring

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided ¼" undercut.

2. Unassembled multiple units do not include mullions.

MD19

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 5½" x 7⁄8" x 16-GA 304 stainless steel hat channel. A flat head and sill are used for sizes thru 13" high

BLADE: 16-GA 304 stainless steel single thickness; Parallel action

AXLES: 304 stainless steel stub

BEARINGS: Stainless steel

LINKAGE: 304 stainless steel angle and crank plates with stainless steel pivots; In-jamb type or on-blade type

STOPS: 18-GA 304 stainless steel at head and sill

BLADE SEALS: Silicone

JAMB SEALS: Stainless steel

CAULKING: Hardcast Irongrip 601 or UL-listed equivalent

FINISH: Mill

OPTIONS

212°F Replaceable Fusible Link

Factory-Supplied Sleeves (20-GA through 10-GA)

Round, or Oval Transitions

Tab-Lock Retaining Angles (Galvanized Steel)

316 Stainless Steel (where available)

NOTES

1. "A" width and "B" height are opening dimensions. Dampers are provided ¼" undercut.

Stainless Steel

Fire Damper Models: 119, 319, MD19

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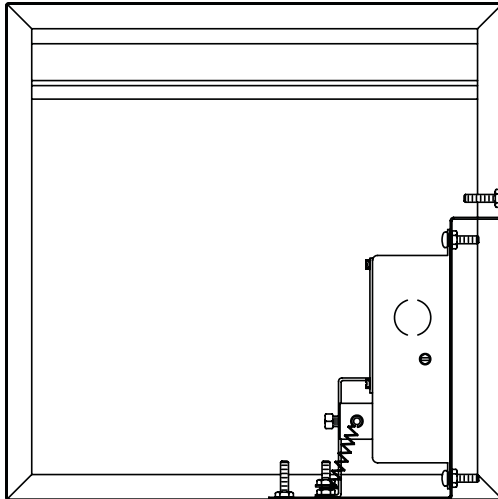
PK1202

Fire Damper Models: 119, 15S, 17S, 117, D19, 15D, 17D, D17, 319, 30S, 38S, 317, D39, 30D, 38D, D37

NOTES

1. PK1202 switch package consists of 2 S.P.D.T. cam activated switches each rated at 11A-1/3 HP-120VAC.
2. Unused leads to be insulated.
3. Mounted switch must not prevent proper blade closure.
4. With blades open, make sure trip rod is lifted to underside of trip rod stop.
5. By gently bending the trip rod, minor adjustments to where the switches trip can be made.
6. A minimum of 4 1/4" of clearance is required from the edge of the damper frame (on the switch side) to the face of a duct transition.
7. Right-side and left-side mounted switch assemblies constructed of identical components but assembled differently.

Top of Damper



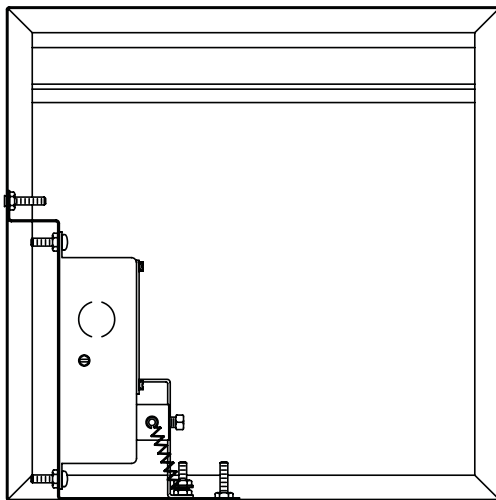
Right Side Mount
Standard Location

		Damper Open	Damper Closed
Top Switch	Gray (C)	C	C
	Orange (NO)	-	C
	Yellow (NC)	C	-

Bottom Switch	Red (C)	C	C
	Brown (NO)	C	-
	Blue (NC)	-	C

C = Continuity to Common

Top of Damper



Left Side Mount
Optional Location

		Damper Open	Damper Closed
Top Switch	Gray (C)	C	C
	Orange (NO)	C	-
	Yellow (NC)	-	C

Bottom Switch	Red (C)	C	C
	Brown (NO)	-	C
	Blue (NC)	C	-

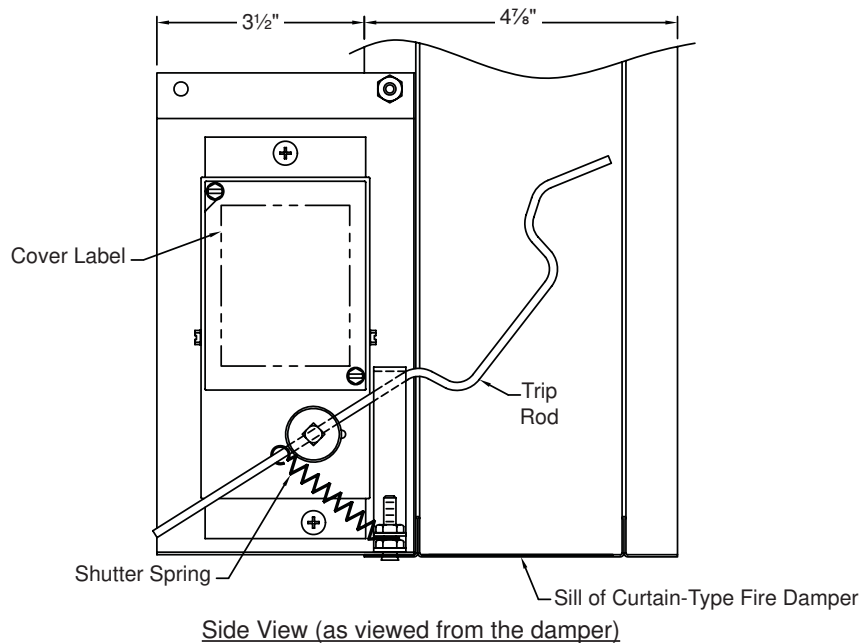
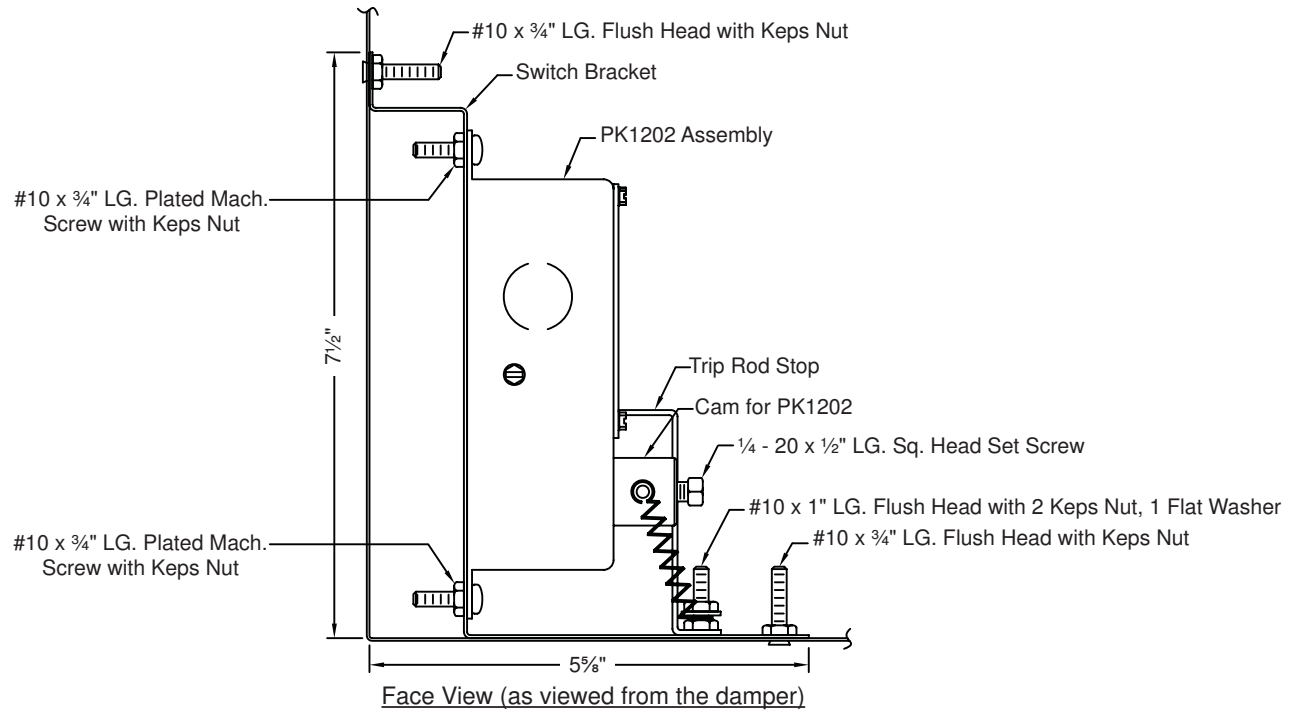
C = Continuity to Common

PK1202

Fire Damper Models: 119, 15S, 17S, 117, D19, 15D, 17D, D17, 319, 30S, 38S, 317, D39, 30D, 38D, D37

NOTES

1. Left-hand mount shown; Right hand mount similar.
2. Not to be used on dampers smaller than 8"W x 8"H when no blade springs, 6"W x 8"H when blade springs.



Out of Wall Curtain Fire Dampers

Fire Damper Models: 119A, 15SA, 17SA, 117SA, D19A, 15DA, 17DA, D17A

APPLICATION

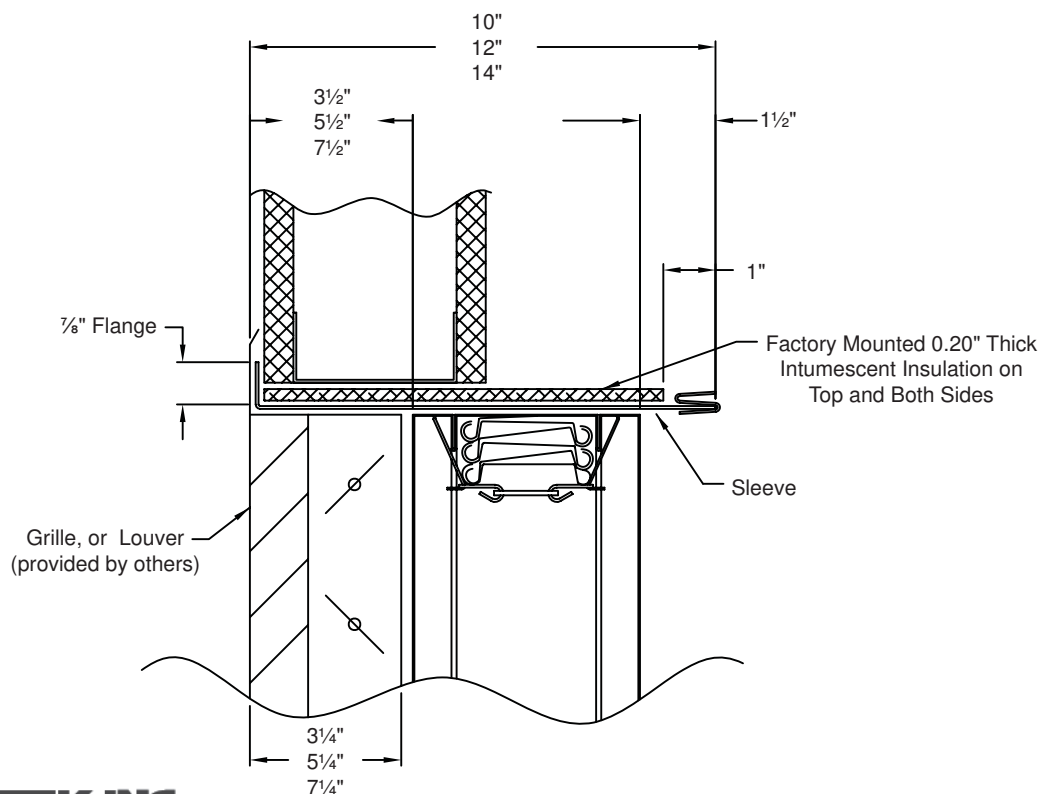
This fire damper is intended to restrict the passage of flame. This installation allows the damper to be positioned so that the closed plane of the blades extend beyond the fire rated masonry/concrete or metal or wood frame gypsum wallboard barrier. The instructions are supplemental to instructions II-FD-1.5.

PANEL SIZE

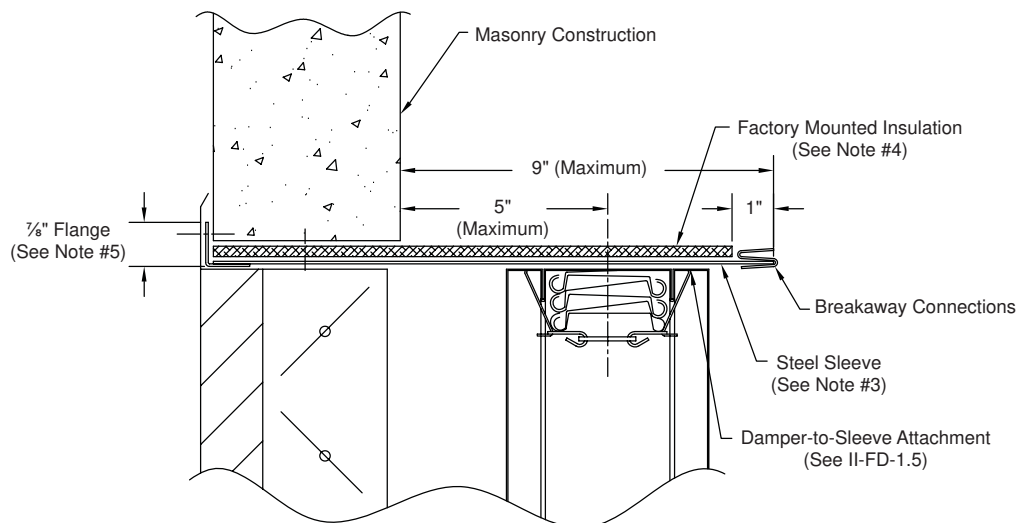
Model	Maximum Panel
Static Curtain Vertical	36"W x 42"H
Dynamic Curtain Vertical	36"W x 36"H

Notes:

- This installation is limited to the following:
 - Two hour or less rated wall or partition.
 - Vertically mounted curtain damper.
- Opening Framing Details:** See II-FD-1.5.
- Sleeve:** Damper is to be factory mounted into the insulated flange sleeve. Steel Sleeve is 20-GA minimum, 14-GA maximum.
- Insulation:** Insulation is factory mounted 0.20" thick intumescent insulation on top and both sides. It is attached to the damper sleeve with either a double row of flat head screws on 24" maximum c/c or a double row of self-piercing rivets on 8" maximum c/c.
- Flange:** $\frac{7}{8}$ " x 16-GA steel spot welded to the sleeve.
- Grille:** A minimum 26-GA steel frame is required, core of grille can be aluminum or nonmetallic. If a thinner or non-steel grille frame is used, then open corners of flanged sleeve must be closed off with 20-GA (minimum) steel corner tabs (by others) riveted to flanges.
- Opening Size:** No expansion clearance is required, but sufficient clearance between the damper and the opening is required for the insulation and for mounting. The minimum opening width shall be $\frac{3}{8}$ " larger than the nominal width. The minimum height shall be $\frac{1}{4}$ " larger than the nominal height. The maximum opening size shall be no more than $\frac{1}{4}$ " greater than the minimum opening size. **Example:** An 18"W x 24"H nominal size damper will require a minimum opening width of 18 $\frac{3}{8}$ " and a minimum opening height of 24 $\frac{1}{4}$ ". **Note:** The preceding example is based on the standard 20-GA sleeve.
- Mounting Damper to Opening:** Unlike traditional fire damper installations, this damper requires no perimeter retaining angles (except when mounted in wood framing). To mount the damper, insert the damper into the opening until the flange contacts the wall face, see note #7 for proper opening size. Through the grille clearance area of the sleeve, secure the damper to the wall framing using #10 steel screws 12" O.C. (maximum), 6" (maximum) from each corner, minimum of one fastener per each side, bottom and top. For masonry construction, use #10 (minimum) steel concrete screws or anchors 12" O.C. (maximum), 6" (maximum) from each corner, minimum of one fastener per each side, bottom and top.



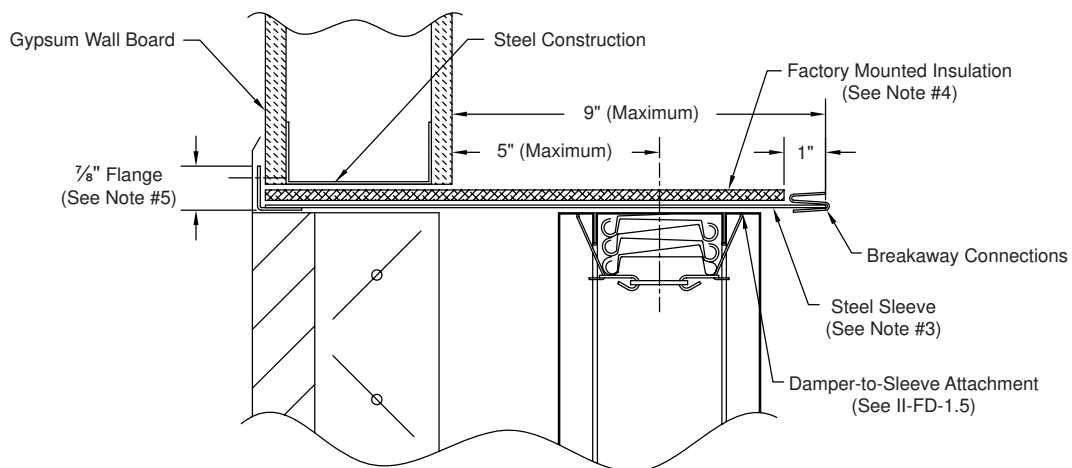
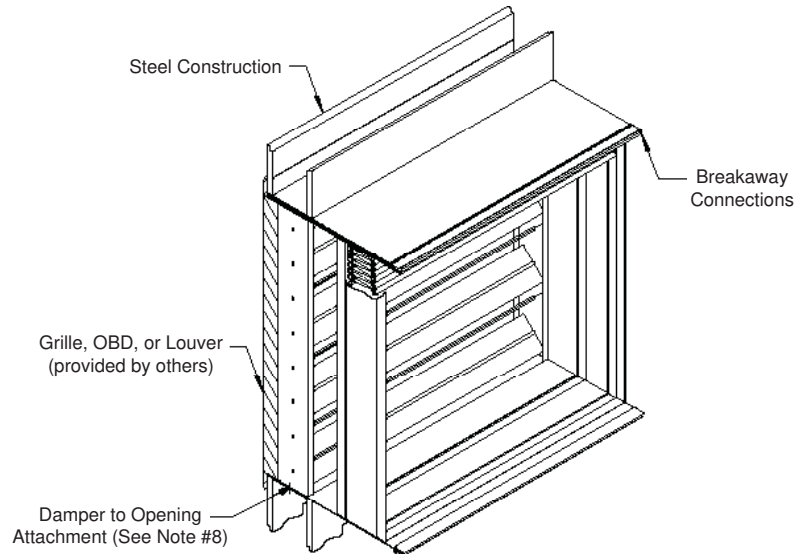
OUT OF WALL for MASONRY OPENING



Out of Wall Curtain Fire Dampers

Fire Damper Models: 119A, 15SA, 17SA, 117SA, D19A, 15DA, 17DA, D17A

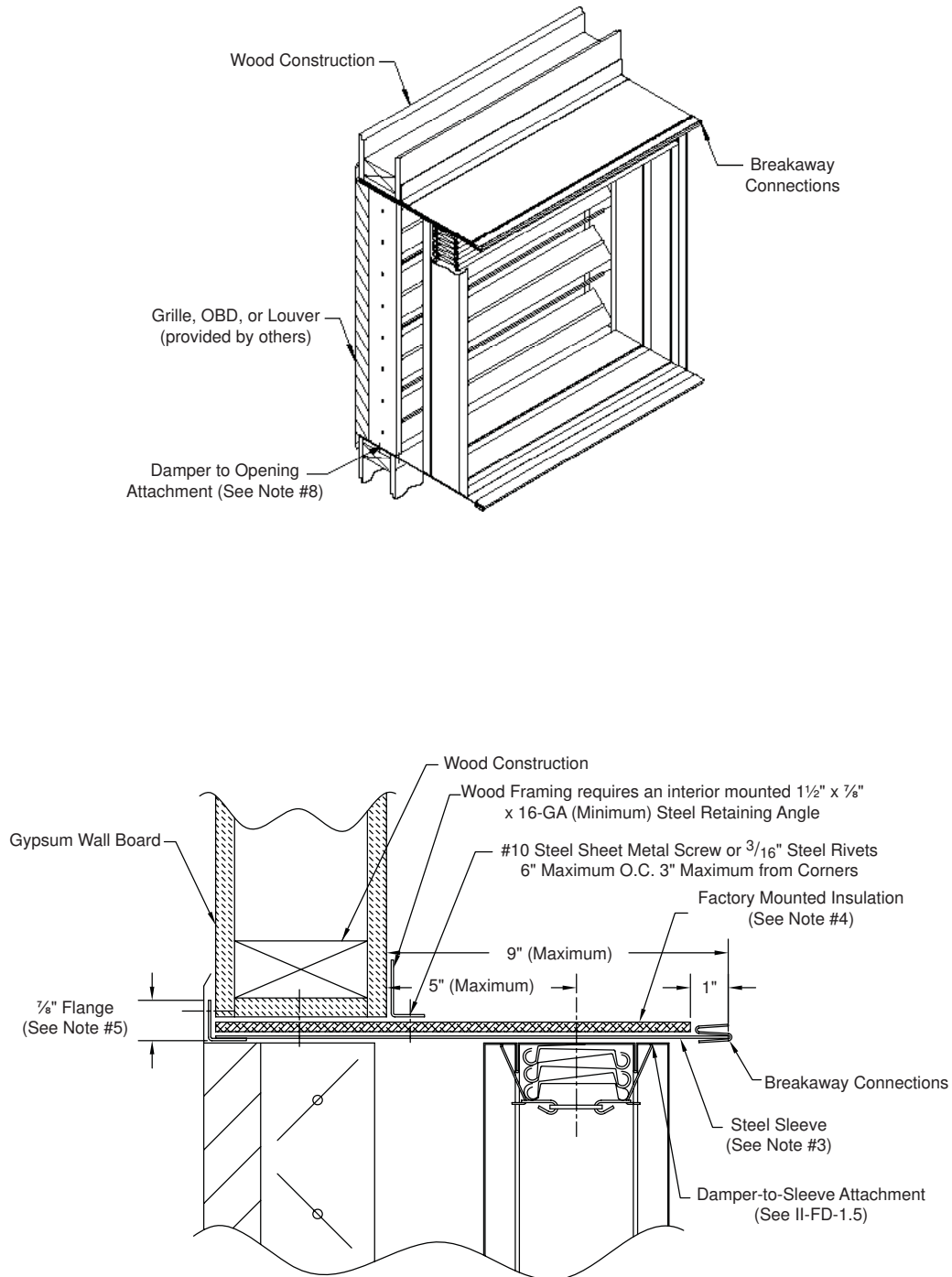
OUT OF WALL for STEEL FRAMED OPENING



Out of Wall Curtain Fire Dampers

Fire Damper Models: 119A, 15SA, 17SA, 117SA, D19A, 15DA, 17DA, D17A

OUT OF WALL for WOOD FRAMED OPENING



Grille Transfer for Curtain Fire Dampers

Fire Damper Models: 119, 15S, 17S, 117, D19, 15D, 17D, D17

APPLICATION

This fire damper is intended to restrict the passage of flame. The standard installation requires that the damper is positioned so that the closed plane of the blades is within the fire rated masonry/concrete or metal or wood framed gypsum wallboard barrier.

This damper must be mounted in the vertical position with the damper blades running horizontally. Airflow can be from either direction. The damper can be mounted in a fire barrier constructed of masonry/concrete or metal or wood framed gypsum wallboard materials.

SIZE LIMITATIONS

Model	Orientation	Vertical
	Assembly	Maximum Panel
	Thinline Curtain	40"W x 20"H
	Static Curtain	40"W x 20"H
	Dynamic Curtain	36"W x 20"H

INSTALLATION

- Less than 3-Hour rated wood or metal framed or masonry vertical wall, barrier or partition constructed per UL's Fire Resistance Directory or other construction as approved by the AHJ. Fire resistant filler material lining the depth of the opening required when wood framing is used.
- 20-GA (minimum) steel sleeve with $\frac{13}{16}$ " (minimum) flange. Sleeve depth to be flush or to extend beyond the non-flanged face of the barrier. Sleeve flange corners can be open only if a 26-GA (minimum) steel grille flange completely covers the damper sleeve flange. When metal framing, sleeve flange can be on top of or under the gypsum wallboard. When wood framing, sleeve flange must be on top of the gypsum wallboard.
- Attach the damper to the sleeve -
 119F, 15SF, 17SF, 117F - The thinline fire damper is to be mounted within the plane of the fire barrier. The damper stitch is welded to the sleeve on both faces by $\frac{1}{2}$ " minimum long welds on 6" maximum centers. The first and last welds are not to exceed 3" from each corner.

 119A, 15SA, 17SA, 117A, D19A, 15DA, 17DA, D17A - The standard frame fire damper is to be mounted within the plane of the fire barrier. The damper is attached to the sleeve using the same double row of fasteners used to mount the assembly to the opening. (See note #5 for details on fasteners.)

 119A, 15SA, 17SA, 117A, D19A, 15DA, 17DA, D17A Alternate - The damper can be fastened to the sleeve on both faces of the damper using $\frac{1}{2}$ " long stitch welds or Tog-L-Loc type fasteners. Fasteners must be on 6" maximum centers with the first and last fasteners within 3" of each corner with a minimum of two fasteners per side of each face. Damper assembly attached to the opening using a double row of fasteners. (See note #5 for details on fasteners.)
- Attach grille to either the sleeve flange, the depth of the sleeve, or directly into the wall framing. Grille and its fasteners not provided by the factory.
- The fastener spacing to attach the damper assembly to the opening should not exceed 6". The first and last fasteners are not to exceed 3" from each corner, with a minimum of two fasteners per side. Fasteners must penetrate the wood or metal framing and not be embedded solely into the gypsum wallboard. Fasteners to be on both the flanged side of the damper and on the non-flanged side of the damper. Fasteners not provided by the factory.

The fasteners for masonry/concrete construction should be $\frac{3}{16}$ " diameter "Tapcon" or equal with a minimum of $1\frac{1}{2}$ " penetration.
 The fasteners for metal construction are fine thread, minimum #10, drywall screws with a minimum of 1" penetration into the framing.
 The fasteners for wood construction are coarse thread, minimum #10, drywall screw with a minimum of 1" penetration into the framing.

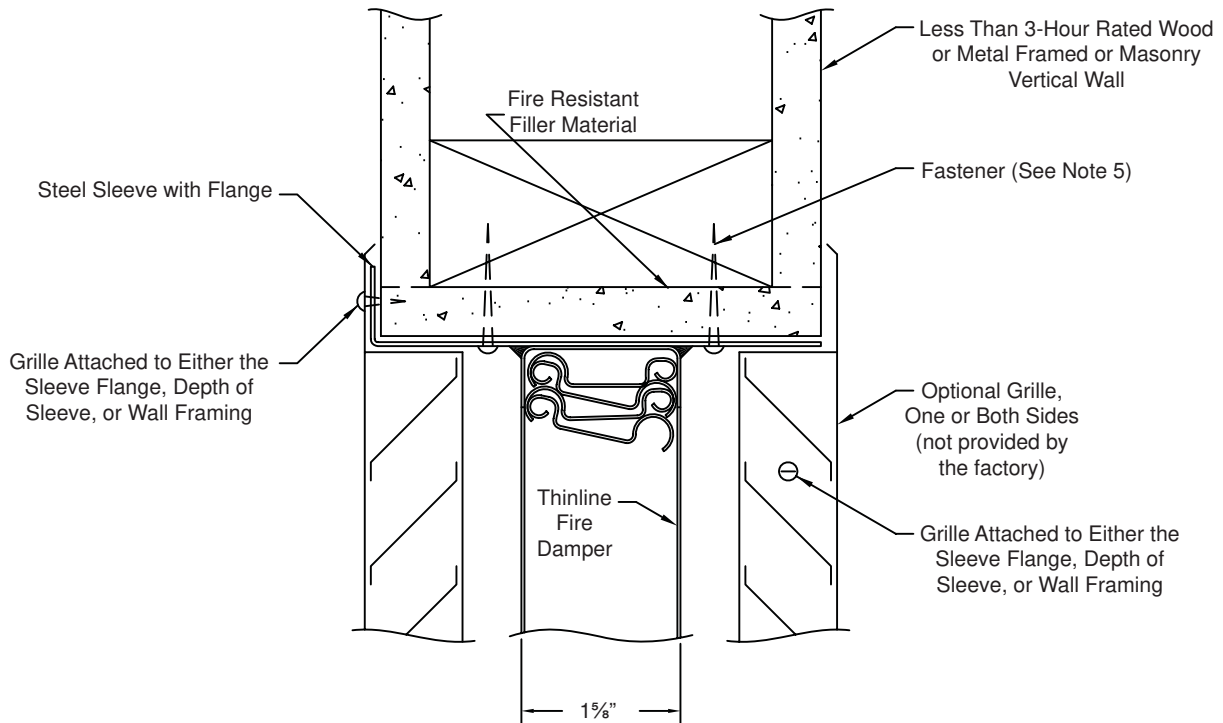
To insure a proper installation; remove the fuse link to cycle the damper, reopen the damper, re-install the fuse link identical to how the factory installed the fuse link.

- Minimum $\frac{1}{8}$ " expansion clearance is required in both width and height between the damper assembly and the opening.

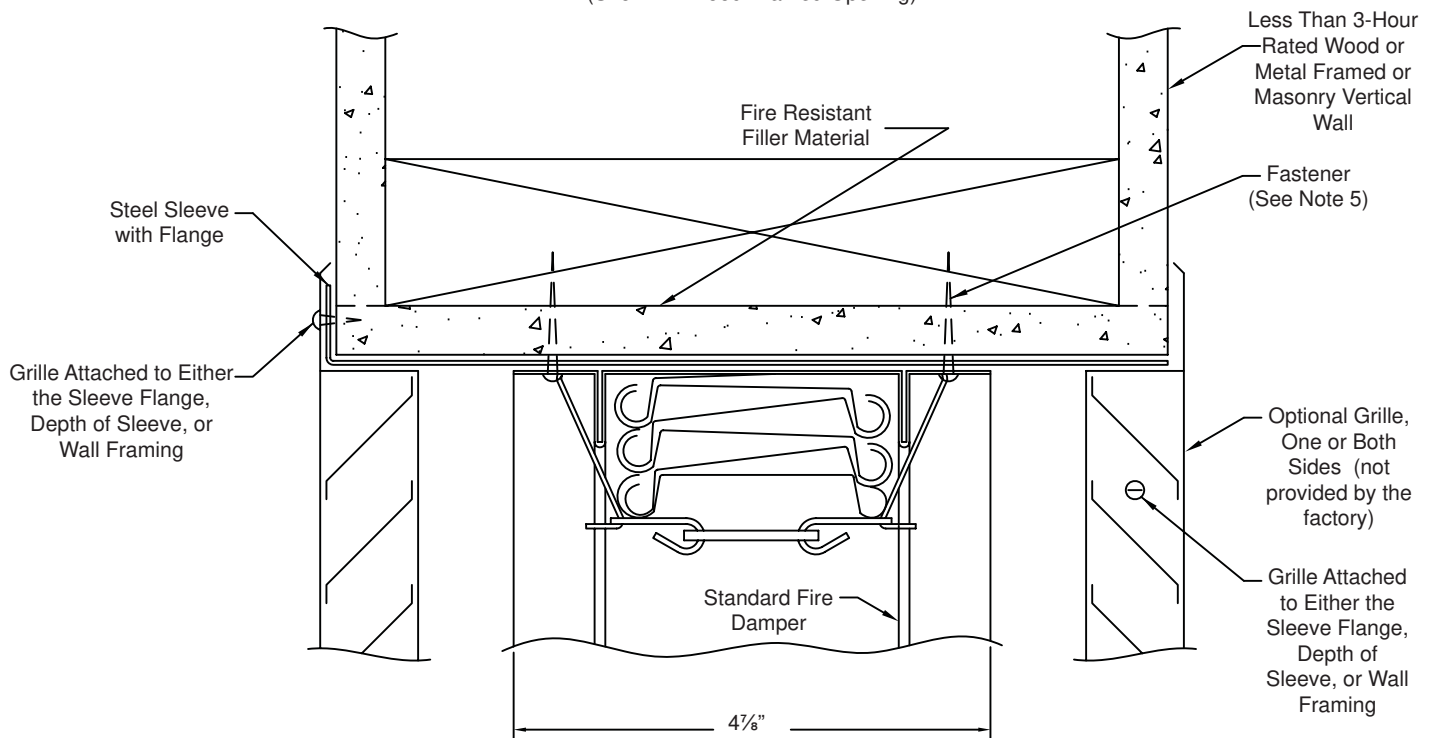
Grille Transfer for Curtain Fire Dampers

Fire Damper Models: 119, 15S, 17S, 117, D19, 15D, 17D, D17

Thinline Curtain Fire Damper in Grille Transfer Opening (Shown in Wood-Framed Opening)



Standard Curtain Fire Damper in Grille Transfer Opening (Shown in Wood-Framed Opening)



Sleeve Extension

Fire Damper Models: 119, 15S, 17S, 117, D19, 15D, 17D, D17, 319, 30S, 38S, 317, D39, 30D, 38D, D37, MA19, 15MA, 17MA, MA17, MD19, 15MD, 17MD, MD17, MA39, 30MA, 38MA, 37MA, MD39, 30MD, 38MD, 37MD

Fire/Smoke Damper Models: FR, CR, MR, AR, FS, CG, MS, AS, FT, CH, MT, AT, FA, CA, MA, UA, TA, CT, LA

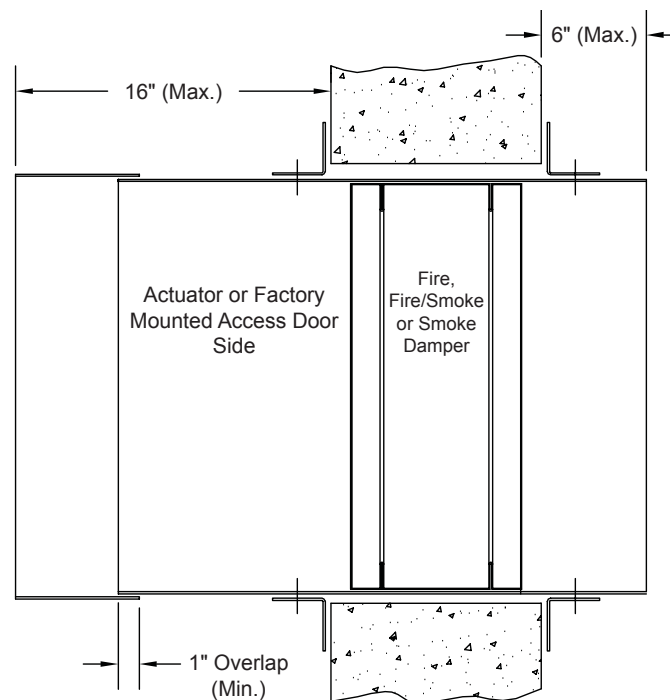
Smoke Damper Models: SR, SR, KR, UR, SH, SG, KH, A, SA, GA, KA, AA

APPLICATION

The factory installed sleeve for fire dampers, combination fire/smoke dampers, and smoke dampers may require a sleeve extension mounted in the field. This supplemental information provides guidelines for field-attachment of a sleeve extension onto a factory supplied damper sleeve. The connection must attach on all four sides. Sleeve extension can be on either end of damper.

INSTALLATION

- General:** The installation of the damper and all duct connections to the damper sleeve shall conform to NFPA-80 and 90A and the SMACNA Fire, Smoke and Radiation Damper Installation Guide. All duct connections shall also conform to UL555 when the damper is intended to be used as a fire damper.
- Extension Gauge:** Extension shall be the same gauge and material as the sleeve to which it is attached. Gauges shall conform to SMACNA or ASHRAE duct standards.
- Sleeve Overlap:** Sleeve extension must have a minimum of 1" overlap to the factory sleeve. The overlap of the two materials must not project into the plane of the rated wall. If the sleeve terminated in the wall, a full sleeve is required.
- Fasteners:** Sleeve to sleeve extension fasteners shall be on 6" maximum centers and 3" maximum from each corner. A field supplied sleeve extension is attached to the damper sleeve with $\frac{3}{16}$ " diameter steel rivets, $\frac{1}{4}$ " diameter steel bolts, #10 steel sheet metal screws, or $\frac{1}{2}$ " long welds. The fasteners cannot be placed where they will interfere with the operation of the damper.
- Caulking:** Sleeve Extensions on smoke and fire/smoke dampers are to be caulked. Caulk shall be one of the following: Dow Corning RTV732, Silco Sil-Bond RTV 4500, General Electric IS808. Caulking is allowed between the retaining angles and the damper sleeve, and between the retaining angles and the face of the floor or wall construction. Caulking is not allowed between the damper sleeve and the wall or floor inside the opening.



Sleeve Extension

Fire Damper Models: 119, 15S, 17S, 117, D19, 15D, 17D, D17, 319, 30S, 38S, 317, D39, 30D, 38D, D37, MA19, 15MA, 17MA, MA17, MD19, 15MD, 17MD, MD17, MA39, 30MA, 38MA, 37MA, MD39, 30MD, 38MD, 37MD

Fire/Smoke Damper Models: FR, CR, MR, AR, FS, CG, MS, AS, FT, CH, MT, AT, FA, CA, MA, UA, TA, CT, LA

Smoke Damper Models: SR, SR, KR, UR, SH, SG, KH, A, SA, GA, KA, AA

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Installation of Flanged Duct Connection for UL Dampers

Fire Damper Models: 119, 15S, 17S, 117, D19, 15D, 17D, D17, 319, 30S, 38S, 317, D39, 30D, 38D, D37, MA19, 15MA, 17MA, MA17, MD19, 15MD, 17MD, MD17, MA39, 30MA, 38MA, 37MA, MD39, 30MD, 38MD, 37MD

Fire/Smoke Damper Models: FR, CR, MR, AR, FS, CG, MS, AS, FT, CH, MT, AT, FA, CA, MA, UA, TA, CT, LA

APPLICATION

Breakaway connections are required in order to allow the duct work connecting a fire rated damper sleeve to "breakaway" from the damper sleeve so that the damper remains within the fire rated opening, thus maintaining the integrity of the wall or floor. The flanged connections included here within are UL approved for use as breakaway connections if installed per these installation instructions.

These tables detail successful SMACNA sponsored testing at Underwrites Laboratories conducted in 1991 under Assignment No. 91NK15526. Contact specific flanged duct connection manufactures regarding larger sizes or different number of cleats.

PANEL SIZE LIMITATIONS

Curtain Damper Size/Cleat Requirement

		Number of Cleats per Side				
		1	2	3	4	5
Connection	TDC	n/a	24"W x 24"H	n/a	60"W x 60"H	n/a
	TDF	18"W x 18"H	24"W x 24"H	48"W x 48"H	60"W x 60"H	n/a
	Ductmate	n/a	18"W x 18"H	n/a	n/a	60"W x 60"H
	Ward	12"W x 12"H	n/a	n/a	48"W x 48"H	n/a
	Nexus	n/a	n/a	24"W x 24"H	n/a	n/a

Multi-Blade Fire Damper and Fire/Smoke Damper Size/Cleat Requirement

		Number of Cleats per Side			
		1	2	3	4
Connection	TDC	n/a	24"W x 24"H	36"W x 48"H	n/a
	TDF	18"W x 18"H	n/a	36"W x 48"H	n/a
	Ductmate	12"W x 12"H	n/a	n/a	36"W x 48"H
	Ward	n/a	24"W x 24"H	n/a	36"W x 48"H
	Nexus	n/a	n/a	n/a	36"W x 48"H

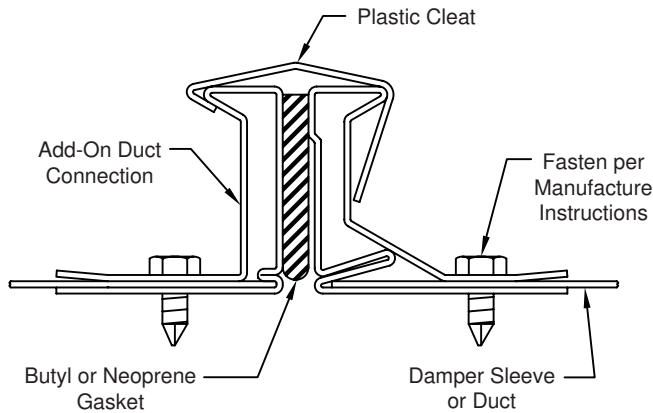
REQUIREMENTS

1. Per flanged system manufacture's instructions, install the flange system onto the damper sleeve or duct.
2. Seal the two flange systems together with neoprene or butyl gasket.
3. Align the flanges together. An optional $\frac{3}{8}$ " bolt may be used to help alignment.
4. Install the cleats equally spaced in quantities per the chart provided above.
5. Flange connector to damper sleeve and/or flange connector to flange connector can be caulked using Design Polymeric's DP1010 or Precision's PA2084T.

Installation of Flanged Duct Connection for UL Dampers

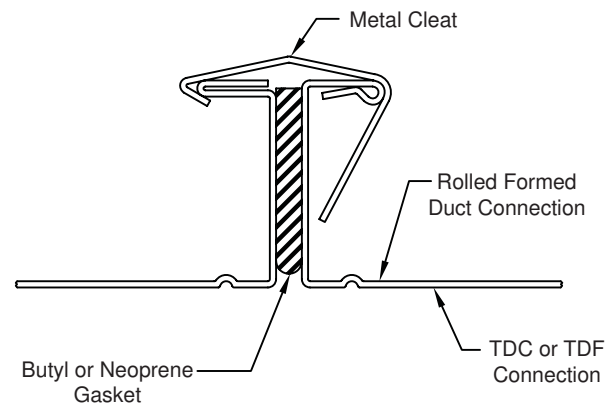
Fire Damper Models: 119, 15S, 17S, 117, D19, 15D, 17D, D17, 319, 30S, 38S, 317, D39, 30D, 38D, D37, MA19, 15MA, 17MA, MA17, MD19, 15MD, 17MD, MD17, MA39, 30MA, 38MA, 37MA, MD39, 30MD, 38MD, 37MD

Fire/Smoke Damper Models: FR, CR, MR, AR, FS, CG, MS, AS, FT, CH, MT, AT, FA, CA, MA, UA, TA, CT, LA



Ductmate, Ward, and Nexus Connections

- Connections assembled without the four corner nuts and bolts
- Cleats as required per chart on the front
- Maximum size of 60"W x 60"H for use with Curtain Fire Dampers
- Maximum size of 36"W x 48"H for use with Multi-Blade Fire and Fire/Smoke Dampers



TDC, TDF Flanged Connections

- Connections assembled with or without the four $\frac{3}{8}$ " corner nuts and bolts
- Cleats as required per chart on the front
- Maximum size of 60"W x 60"H for use with Curtain Fire Dampers
- Maximum size of 36"W x 48"H for use with Multi-Blade Fire and Fire/Smoke Dampers



Ceiling Radiation Dampers

- 289 — Rectangular, Two-Blade/Un-Insulated
- 291 — Rectangular, Two-Blade/Insulated
- 293 — Rectangular, Four-Blade/ Insulated
- 295 — Round, Two-Blade/Un-Insulated
- 297 — Round, Two-Blade/Insulated

Supplemental Info — Thermal Blanket

air balance

Dampers  Louvers
UL Life Safety Products

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MODEL 289

2 Blade • Un-Insulated • For Use in Static Systems • Rectangular Ceiling Radiation Damper

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 22-GA galvanized steel; one piece; 2 ²¹/₃₂" standard depth**BLADES:** 22-GA galvanized steel**FUSIBLE LINK:** 165°F**SPRING:** Extension type**FINISH:** Mill**OPTIONS**

212°F Fusible Link

Thermal Blanket

Top Extension (total frame depth 6¹/₂")Bottom Extension (total frame depth 6¹/₂")Top and Bottom Extension (total frame depth 9¹/₄")**NOTES**

1. The larger dimension is always the width, and is parallel to the blades.

2. Dampers are provided exact size in 1" increments.

Deduct ¹/₄" :

- A. For installation where damper is to be installed inside a steel duct.
- B. For lay-in installation where damper is to be installed directly into the tee bar grid of the ceiling.

Do **not** deduct ¹/₄" :

For surface mount ductless installation where damper is to be installed over the neck of a grille or lay-in diffuser.

3. This ceiling damper is used to provide the required fire and heat radiation protection of HVAC penetrations of Floor Ceiling and Roof-Ceiling Assemblies having a Restrained or Unrestrained Assembly Fire Resistance Ratings of 2 hour or less, in accordance with UL263. Standard Fire Dampers (1¹/₂ hr. and 3 hr.) do not provide the necessary heat radiation protection. Ceiling Dampers are also called Ceiling Fire Dampers, Radiation Dampers, and Radiation Shields. See Air Balance's UL-Approved Installation Instructions for various installation requirements and procedures. Approved Ceiling Designs are illustrated by Design Number in UL's Fire Resistance Directory.

DAMPER SIZE

Orientation	Horizontal (Ceiling) Mount Only	
Panels	Min Panel	Max Panel
289	4"W x 4"H	100 sq.in. 18"W 10"H

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED STATIC CEILING DAMPER

FIRE RESISTANCE RATING

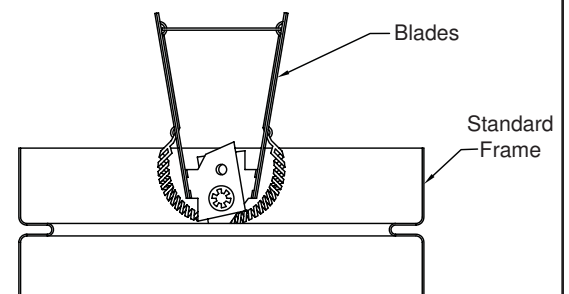
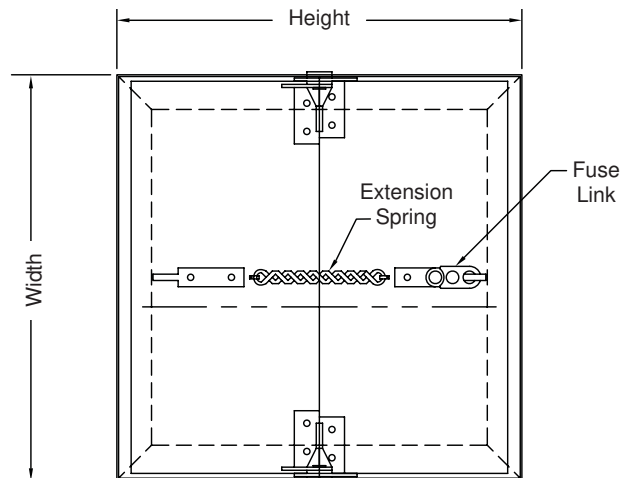
abi air balance

FILE #R11235



This ceiling radiation damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555C
- New York City MEA Listing #110-99-M
- California State Fire marshal Listing #3226-1328:105
- 1 hour Combustible Ceiling Assemblies
- 1 hour and 2 hour Non-Combustible Ceiling Assemblies



MODEL 289

2 Blade • Un-Insulated • For use in Static Systems • Rectangular Ceiling Radiation Damper

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MODEL 291

2 Blade • Insulated • For Use in Static Systems • Rectangular Ceiling Radiation Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 22-GA galvanized steel; one piece; 2 ²¹/₃₂" standard depth
BLADES: 22-GA galvanized steel
INSULATION: ½" thick gypsum
FUSIBLE LINK: 165°F
SPRING: Extension type
FINISH: Mill

OPTIONS

212°F Fusible Link
 Thermal Blanket
 Top Extension (see chart)
 Bottom Extension (see chart)
 Top and Bottom Extension (see chart)

NOTES

- The larger dimension is always the width, and is parallel to the blades.
- Dampers are provided exact size in 1" increments.
 Deduct ¼":
 A. For installation where damper is to be installed inside a steel duct.
 B. For lay-in installation where damper is to be installed directly into the tee bar grid of the ceiling.
 Do *not* deduct ¼":
 For surface mount ductless installation where damper is to be installed over the neck of a grille or lay-in diffuser.
- This ceiling damper is used to provide the required fire and heat radiation protection of HVAC penetrations of Floor Ceiling and Roof-Ceiling Assemblies having a Restrained or Unrestrained Assembly Fire Resistance Ratings of 2 hour or less, in accordance with UL263. Standard Fire Dampers (1½ hr. and 3 hr.) do not provide the necessary heat radiation protection. Ceiling Dampers are also called Ceiling Fire Dampers, Radiation Dampers, and Radiation Shields. See Air Balance's UL-approved Installation Instructions for various installation requirements and procedures. Approved Ceiling Designs are illustrated by Design Number in UL's Fire Resistance Directory.

DAMPER SIZE

Orientation	Horizontal (Ceiling) Mount Only	
Panels	Min Panel	Max Panel
291	11"W x 6"H	324 sq.in. 18"W 18"H

Frame Extension Chart

Depths listed are total frame depths.	Heights: 5¾" - 10"	Heights: 10¾" - 14"	Heights: 14¾" - 18"
Top Extension	9¼"	9¼"	10¾"
Bottom Extension	6⅞"	6⅞"	6⅞"
Top and Bottom Extension	9¼"	10¾"	12¾"

UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED STATIC CEILING DAMPER
 FIRE RESISTANCE RATING

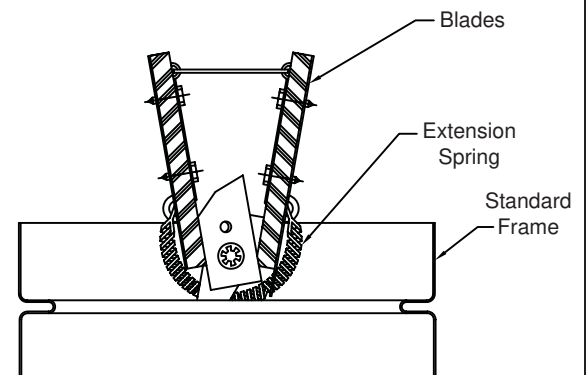
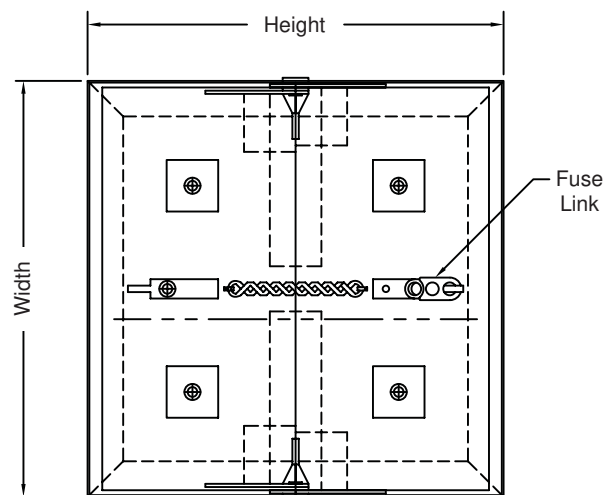
abi air balance

FILE #R11235



This ceiling radiation damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555C
- New York City MEA Listing #110-99-M
- California State Fire marshal Listing #3226-1328:105
- 1 hour Combustible Ceiling Assemblies
- 1 hour and 2 hour Non-Combustible Ceiling Assemblies



MODEL 291

2 Blade • Insulated • For Use in Static Systems • Rectangular Ceiling Radiation Damper

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MODEL 293

4 Blade • Insulated • For Use in Static Systems • Rectangular Ceiling Radiation Damper

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 22-GA galvanized steel; one piece; 2 ²¹/₃₂" standard depth**BLADES:** 22-GA galvanized steel**INSULATION:** ½" thick gypsum**FUSIBLE LINK:** 165°F**SPRING:** Extension type**FINISH:** Mill**UNDERWRITERS LABORATORIES INC.®**

CLASSIFIED STATIC CEILING DAMPER

FIRE RESISTANCE RATING

abi air balance

FILE #R11235



This ceiling radiation damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555C
- New York City MEA Listing #110-99-M
- California State Fire marshal Listing #3226-1328:105
- 1 hour Combustible Ceiling Assemblies
- 1 hour and 2 hour Non-Combustible Ceiling Assemblies

OPTIONS

212°F Fusible Link

Thermal Blanket

Top Extension (see chart)

Bottom Extension (see chart)

Top and Bottom Extension (see chart)

NOTES

1. The larger dimension is always the height, and is perpendicular to the blades.
2. Dampers are provided exact size in 1" increments.

Deduct ¼":

- A. For installation where damper is to be installed inside a steel duct.
- B. For lay-in installation where damper is to be installed directly into the tee bar grid of the ceiling.

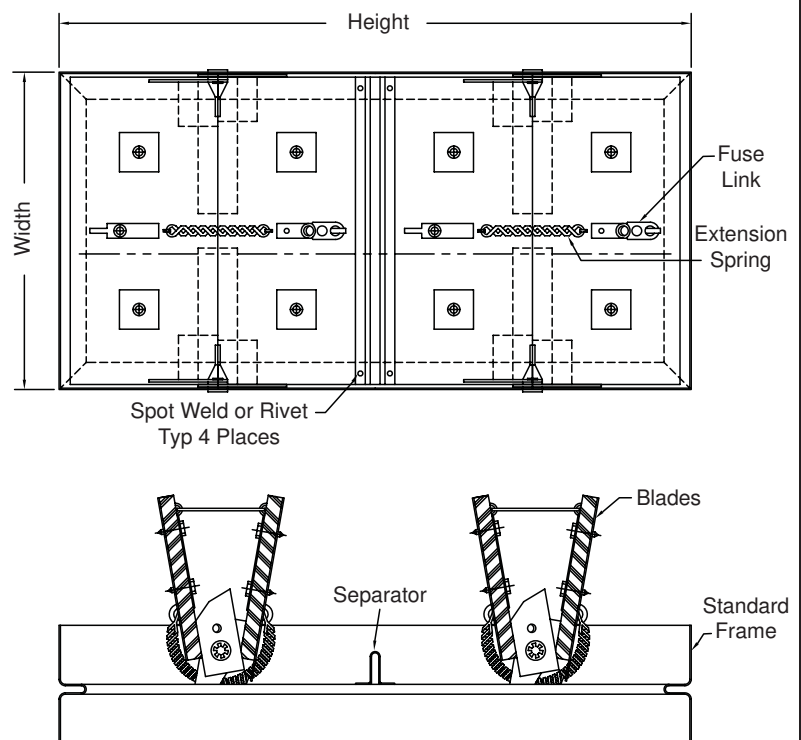
Do **not** deduct ¼":

For surface mount ductless installation where damper is to be installed over the neck of a grille or lay-in diffuser.

3. This ceiling damper is used to provide the required fire and heat radiation protection of HVAC penetrations of Floor Ceiling and Roof-Ceiling Assemblies having a Restrained or Unrestrained Assembly Fire Resistance Ratings of 2 hour or less, in accordance with UL263. Standard Fire Dampers (1½ hr. and 3 hr.) do not provide the necessary heat radiation protection. Ceiling Dampers are also called Ceiling Fire Dampers, Radiation Dampers, and Radiation Shields. See Air Balance's UL-Approved Installation Instructions for various installation requirements and procedures. Approved Ceiling Designs are illustrated by Design Number in UL's Fire Resistance Directory.

DAMPER SIZE

Orientation	Horizontal (Ceiling) Mount Only	
Panels	Min Panel	Max Panel
293	3¾"W x 18¾"H	576 sq.in. 24"W 24"H

**Frame Extension Chart**

Depths listed are total frame depths.	Heights: 18¾" - 20"	Heights: 20¾" - 24"
Top Extension	9¼"	9¼"
Bottom Extension	6⅞"	6⅞"
Top and Bottom Extension	9¼"	10¾"

MODEL 293

4 Blade • Insulated • For Use in Static Systems • Rectangular Ceiling Radiation Damper

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MODEL 295

2 Blade • Un-Insulated • For Use in Static Systems • Round Ceiling Radiation Damper

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 22-GA galvanized steel; one piece; 3 ²⁷/₃₂" standard depth**BLADES:** 22-GA galvanized steel**FUSIBLE LINK:** 165°F**SPRING:** Extension type**FINISH:** Mill**OPTIONS**

212°F Fusible Link

Thermal Blanket

Top Extension (total frame depth 7½")

Bottom Extension (total frame depth 5½")

Top and Bottom Extension (total frame depth 9½")

NOTES

1. Dampers are provided exact size in 1" increments.

Deduct ¼":

A. For installation where damper is to be installed inside a steel duct.

B. For lay-in installation where damper is to be installed directly into the tee bar grid of the ceiling.

Do **not** deduct ¼":

For surface mount ductless installation where damper is to be installed over the neck of a grille or lay-in diffuser.

2. This ceiling damper is used to provide the required fire and heat radiation protection of HVAC penetrations of Floor Ceiling and Roof-Ceiling Assemblies having a Restrained or Unrestrained Assembly Fire Resistance Ratings of 2 hour or less, in accordance with UL263. Standard Fire Dampers (1½ hr. and 3 hr.) do not provide the necessary heat radiation protection. Ceiling Dampers are also called Ceiling Fire Dampers, Radiation Dampers, and Radiation Shields. See Air Balance's UL-Approved Installation Instructions for various installation requirements and procedures. Approved Ceiling Designs are illustrated by Design Number in UL's Fire Resistance Directory.

DAMPER SIZE

Orientation	Horizontal (Ceiling) Mount Only	
Panels	Min Panel	Max Panel
295	5¾" dia.	95 sq.in. 11" dia.

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED STATIC CEILING DAMPER

FIRE RESISTANCE RATING

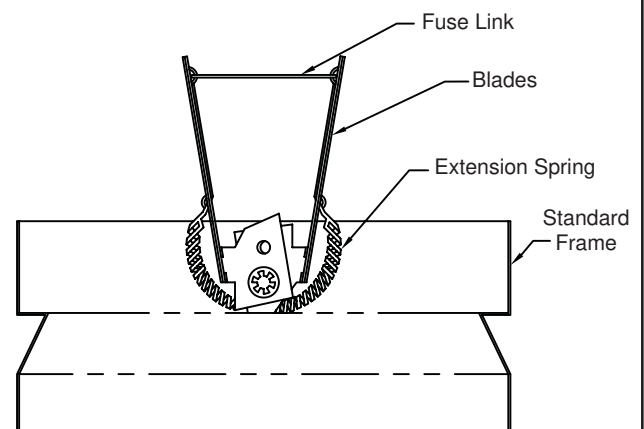
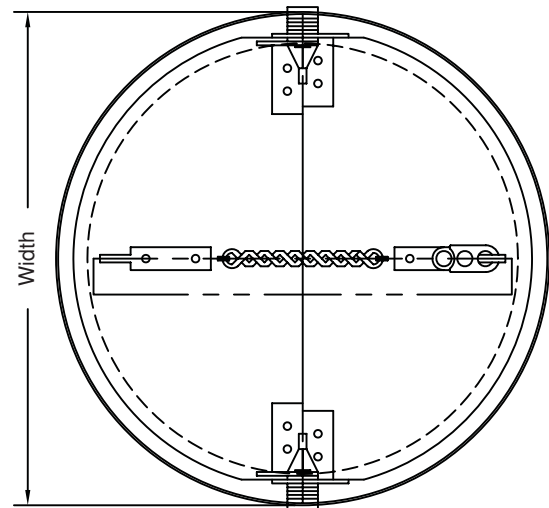
abi air balance

FILE #R11235



This ceiling radiation damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555C
- New York City MEA Listing #110-99-M
- California State Fire marshal Listing #3226-1328:105
- 1 hour Combustible Ceiling Assemblies
- 1 hour and 2 hour Non-Combustible Ceiling Assemblies



MODEL 295

2 Blade • Un-Insulated • For Use in Static Systems • Round Ceiling Radiation Damper

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MODEL 297

2 Blade • Insulated • For Use in Static Systems • Round Ceiling Radiation Damper

STANDARD MATERIALS AND CONSTRUCTION**FRAME:** 22-GA galvanized steel; one piece; 3 ²⁷/₃₂" standard depth**BLADES:** 22-GA galvanized steel**INSULATION:** ½" thick gypsum**FUSIBLE LINK:** 165°F**SPRING:** Extension type**FINISH:** Mill**UNDERWRITERS LABORATORIES INC.®**

CLASSIFIED STATIC CEILING DAMPER

FIRE RESISTANCE RATING

abi air balance

FILE #R11235



This ceiling radiation damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555C
- New York City MEA Listing #110-99-M
- California State Fire marshal Listing #3226-1328:105
- 1 hour Combustible Ceiling Assemblies
- 1 hour and 2 hour Non-Combustible Ceiling Assemblies

OPTIONS

212°F Fusible Link

Thermal Blanket

Top Extension (see Frame Extension Chart)

Bottom Extension (see Frame Extension Chart)

Top and Bottom Extension (see Frame Extension Chart)

NOTES

1. Dampers are provided exact size in 1" increments.

Deduct ¼":

- For installation where damper is to be installed inside a steel duct.
- For lay-in installation where damper is to be installed directly into the tee bar grid of the ceiling.

Do **not** deduct ¼":

For surface mount ductless installation where damper is to be installed over the neck of a grille or lay-in diffuser.

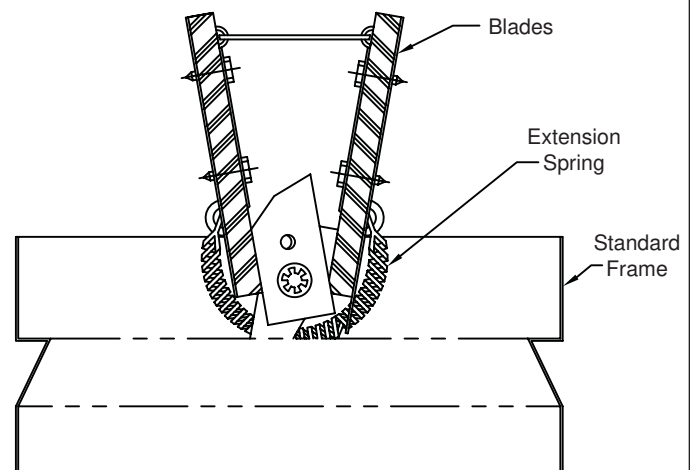
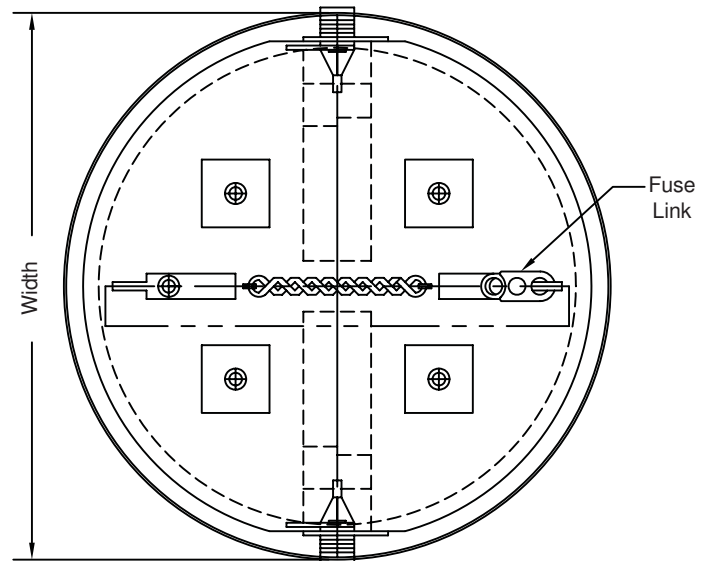
2. This ceiling damper is used to provide the required fire and heat radiation protection of HVAC penetrations of Floor Ceiling and Roof-Ceiling Assemblies having a Restrained or Unrestrained Assembly Fire Resistance Ratings of 2 hour or less, in accordance with UL263. Standard Fire Dampers (1½ hr. and 3 hr.) do not provide the necessary heat radiation protection. Ceiling Dampers are also called Ceiling Fire Dampers, Radiation Dampers, and Radiation Shields. See Air Balance's UL-Approved Installation Instructions for various installation requirements and procedures. Approved Ceiling Designs are illustrated by Design Number in UL's Fire Resistance Directory.

DAMPER SIZE

Orientation	Horizontal (Ceiling) Mount Only	
Panels	Min Panel	Max Panel
297	11¾" dia.	314 sq.in. 20" dia.

Frame Extension Chart

Depths listed are total frame depths.	Heights: 11¾" - 16"	Heights: 16¾" - 20"
Top Extension	10½"	12½"
Bottom Extension	5½"	5½"
Top and Bottom Extension	12⅞"	14⅞"



MODEL 297

2 Blade • Insulated • For Use in Static Systems • Round Ceiling Radiation Damper

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Thermal Blanket

Ceiling Radiation Damper Models: 289, RCU, L89, A89, 291, RCI, L91, A91, 293, RC4, L93, A93, 295, RDU, L95, A95, 297, RDI, L97, A97

APPLICATION

This thermal blanket is used in most lay-in or sloped surface mount diffuser/grille installations, along with the ceiling damper in order to provide adequate protection.

AVAILABLE SIZE

24"W x 24"H
30"W x 30"H

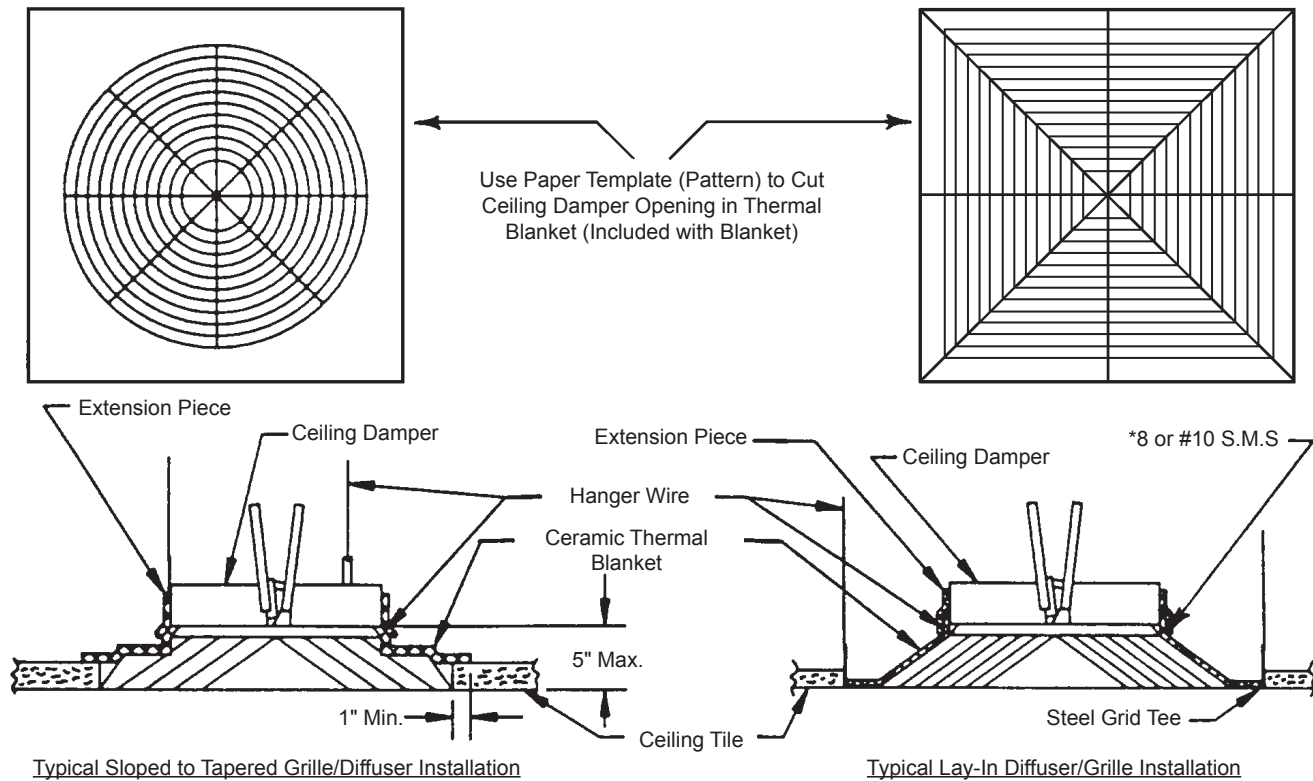
Notes:

1. A Thermal Blanket is required for ceiling dampers supported by a lay-in diffuser or grille.
2. The area below the plane of the ceiling damper blade down to the topside of the diffuser/grille must be insulated. Two methods of insulating this area may be employed when the topside of the diffuser/grille is flat and is raised no more than $\frac{1}{2}$ " from the face of the ceiling:
 - A. The first and most convenient method is to use a Thermal Blanket. Cut the desired hole, and lay the Thermal Blanket over the diffuser/grille. Next, take an extension piece of the blanket and wrap it around the damper/diffuser overlap connection. Secure it in place with the use of hanger wire. The Thermal Blanket should extend out to the tee grid on all four sides.
 - B. An alternative method is to use the same ceiling tile material as is used for the remainder of the ceiling. Although the tile must be cut to allow for the damper/diffuser overlap connection to pass through, the clearance between the tile and the tee grid and between the damper and the tile should not be greater than $\frac{1}{2}$ " total.

EXCEPTION: When the topside of the lay-in diffuser/grille is pitched or contains an obstruction of greater than $\frac{1}{2}$ " from the ceiling surface, the Thermal Blanket *must* be used.
3. When an opposed blade damper is installed between the ceiling damper and the ceiling surface, be sure that the insulation covers the area below the plane of the damper blade down to the topside of the diffuser/grille.
4. When a sloped or tapered surface-mount diffuser/grille is used, the diffuser/grille must be insulated with a Thermal Blanket. The Thermal Blanket should provide insulation from the plane of the ceiling damper blade down to the top of the ceiling surface.
5. The Thermal Blanket is a $\frac{1}{4}$ " thick non-asbestos ceramic fiber, with 8 lbs./cu. ft. density. The blanket offers highly efficient insulation and possesses high tensile strength and resiliency to withstand vibration and physical abuse. It will not separate, sag, or settle. It is characterized by extreme resistance to thermal shock, and its thermal and physical properties are unaffected by oil or water after drying.

Thermal Blanket

Ceiling Radiation Damper Models: 289, RCU, L89, A89, 291, RCI, L91, A91, 293, RC4, L93, A93, 295, RDU, L95, A95, 297, RDI, L97, A97



Fire/Smoke Dampers

- RC — Class I, 1½ Hour, Single Thickness Blade, True Round
- FR1 — Class I, 1½ Hour, Single Thickness Blade
- FR2 — Class II, 1½ Hour, Single Thickness Blade
- FS1 — Class I, 1½ Hour, Single Thickness Blade
- FS1 (SS) — Class I, 1½ Hour, Single Thickness Blade, Stainless Steel
- FS2 — Class II, 1½ Hour, Single Thickness Blade
- FS2 (SS) — Class II, 1½ Hour, Single Thickness Blade, Stainless Steel
- FT1 — Class I, 3 Hour, Single Thickness Blade
- FT2 — Class II, 3 Hour, Single Thickness Blade
- FA1 — Class I, 1½ Hour, Airfoil Blade
- FA2 — Class II, 1½ Hour, Airfoil Blade
- FA2(M) — Class II, 1½ Hour, Modulating Control, Airfoil Blade
- TA1 — Class I, 3 Hour, Airfoil Blade
- TA2 — Class II, 3 Hour, Airfoil Blade
- TA2(M) — Class II, 3 Hour, Modulating Control, Airfoil Blade
- FS1F/G — Class I, Single Thickness Blade, Grille Access
- FS2F/G — Class II, Single Thickness Blade, Grille Access
- FA1F/G — Class I, Airfoil Blades, Grille Access
- FA2F/G — Class II, Airfoil Blades, Grille Access
- FS2C — Class II, Single Thickness Blade, Tunnel Corridor
- 2LO — Lights Only Remote Test Box
- 2PM — Two Position Momentary Remote Test Box
- 2PT — Two Position Toggle Remote Test Box
- 3PT — Three Position Toggle Remote Test Box
- 2PK — Two Position Key Remote Test Box
- EHRD — Electric Heat Response Device
- PHRD — Pneumatic Heat Response Device
- ESOT — Electric Sensotherm
- PSOT — Pneumatic Sensotherm
- IDIP — Integral Dual Position Indication
- PK1200/PK1201 — Blade Position Indication Switch
- SVFS — Sleeves & Sideplates
- TRFS — Transitions

Guide Specifications — FR Series

air balance

Dampers  Louvers
UL Life Safety Products

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FR/SR Redesign

“FR” Fire/ Smoke Damper and “SR” Smoke Damper

The redesigned and improved FR/SR now has adjustable retaining angles! The adjustable retaining angles will allow flexible positioning within the plane of the fire barrier.

Benefits of the FR/SR include:

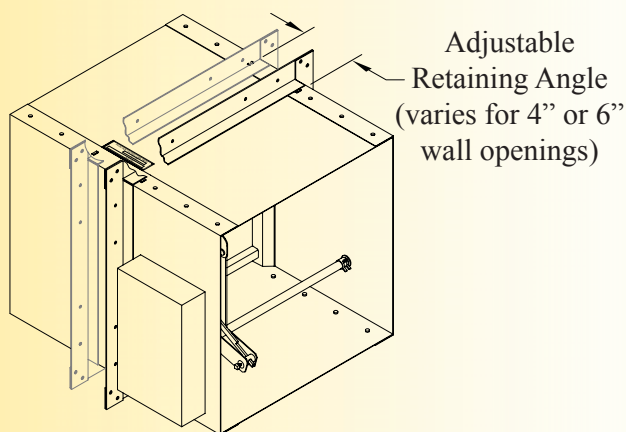
Highest Free Area of any fire/smoke or smoke damper on the market. This patent pending design eliminates much of the internal framing common to typical damper designs.

Lowest Pressure Drop in the industry. Compare the FR and SR series dampers to any other UL combination fire/smoke and smoke damper on the market. The difference in the [air balance](#) damper is significant.

AMCA Certified Ratings Program tested. The [air balance](#) damper performance results indicate no other damper compares in free area or pressure drop.

Lower Annual Energy Costs and life cycle costs. These dampers can provide the building owner with both initial design cost savings via fan hp reductions, and life cycle cost savings via annual energy cost reduction. Energy costs continue to rise and the FR and SR series dampers can pay for themselves in reduced energy expense.

Reduces Labor Costs in field installation time. **The factory supplied sleeve is fabricated with one-side adjustable perimeter mounting angles,** which reduces field labor and provides the contractor with a “slide in” installation.



air balance

Dampers  Louvers
UL Life Safety Products

P.O. Box 606 • 7435 Industrial Rd Florence KY 41042
Phone: 859-538-3400 Fax: 859-647-7810
www.airbalance.com



abi FR/SR Pressure Drop in.wg (Face Velocity=2000 fpm)

		Width						
		6	8	10	12	16	20	24
Height	6	0.800	0.654	0.571	0.499	0.467	0.437	0.407
	8	0.499	0.381	0.331	0.289	0.251	0.235	0.219
	10	0.355	0.269	0.235	0.203	0.177	0.164	0.15
	12	0.289	0.219	0.190	0.164	0.142	0.122	0.122
	14	0.388	0.294	0.257	0.223	0.195	0.181	0.168
	16	0.388	0.294	0.239	0.223	0.195	0.181	0.168
	18	0.361	0.294	0.239	0.223	0.195	0.181	0.168
	20	0.361	0.294	0.239	0.223	0.195	0.181	0.168
	24	0.294	0.223	0.195	0.168	0.146	0.135	0.126

1. Multiply pressure drop differences by the following conversion factors when the face velocity is less than 2000 fpm:

0.562 for 1500 fpm;
0.249 for 1000 fpm;
0.064 for 500 fpm

2. As a point of reference, historical sales data indicates that 75% of all combination fire/smoke dampers are 24"W x 24"H and under. The FR/SR dampers provide greatly improved performance in these critical sizes.

Here's a typical annual operating cost savings calculation,.

Your project requires a 12"W x 12"H fire/smoke damper with an average duct velocity of 2000 fpm.

The tables above indicate that the **air balance** model FR pressure drop is equal to 0.164 in.wg. A typical comparable competitor model's cataloged pressures drop is equal to 0.539 in.wg. By using the **abi** model FR fire/smoke damper, total pressure drop savings equals 0.375 in.wg.

The following formula is used to calculate Annual Operating Costs (AOC):

Where

\$/kwh = Average Electrical Energy Cost = 0.15

cfm = Airflow Through Fitting in Cubic Feet per Minute = 2000

TFPD = Total Fitting Pressure Drop (Pressure Drop Savings in this Example) = 0.375

Nf = Fan Efficiency = 0.7

hrs = 8760

$$AOC = \frac{(\$ / \text{kwh})(\text{cfm})(\text{TFDP})(0.746 \text{ kw/hp})(\text{hrs})}{(6350)(Nf)(Nm)} = \frac{(0.15)(\text{cfm})(\text{in.wg})(0.746)(8760)}{(6350)(0.7)(0.9)} = \$0.245/\text{cfm/in.wg}$$

*The formula for AOC is a generally accepted formula in the industry.

*The values inserted into the formula were selected based on typical design parameters.

air balance inc. is a division of Mestek, Inc. Mestek, Inc. is a family of over 40 specialty manufacturers providing heating, ventilating, and air conditioning products, coil handling equipment, extruded aluminum products, and computer information systems and services.



P.O. Box 606 • 7435 Industrial Rd Florence KY 41042
Phone: 859-538-3400 Fax: 859-647-7810
www.airbalance.com



MODEL RC

Class I • 250°F or 350°F • Galvanized Steel • True Round Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 20-GA galvanized rolled frame; 18" deep
BLADES: 20-GA double thickness galvanized steel (equal to 14-GA)
AXLES: ½" diameter galvanized or plated steel, full length
BEARING: Oil impregnated bronze sleeve
STOPS: Full open and full closed angle stops
BLADE SEAL: Silicone
CAULKING: UL approved
FINISH: Mill
ACTUATOR: Electric; Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Integral Dual position Indication (IDPI) switches
 Model SM-501 Flow-rated smoke detector; ship loose only
 Model 2151 No-flow smoke detector; ship loose only
 Rolled retaining angles
 Stainless steel bearings
 Copper tubing (for pneumatic actuators)
 Retaining Plates
 Pneumatic Actuator

NOTES

1. Dampers are provided approximately ⅛" undersize.
2. Dampers available in 2" increments only.
3. Dampers ≥ 20" require factory installed ring in center of damper.

DAMPER SIZES

		2000 fpm, 4 in.wg	3000 fpm, 6 in.wg
Orientation	Hor & Vert	Hor & Vert	Hor & Vert
Panels	Minimum Panel	Maximum Panel	Maximum Panel
RC	6" dia.	24" dia.	24" dia.

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
 FIRE RESISTANCE RATING 1½ HR
 LEAKAGE RESISTANCE CLASS I

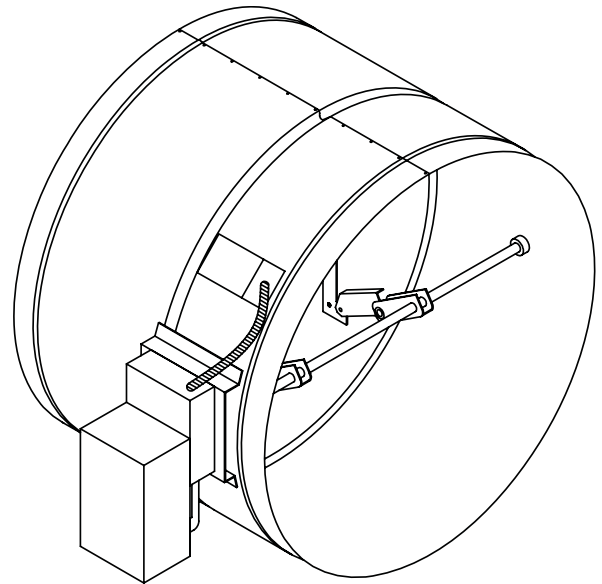
abi air balance

FILE #R4708



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555S and 555
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:123
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



air balance

Dampers Louvers
 UL Life Safety Products
 Division of Mastek
 Member of AMCA

MODEL RC

Class I • 250°F or 350°F • Galvanized Steel • True Round Fire/Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in.wg (6 in.wg depending on actuator selection)
Maximum Velocity: 2000 fpm (3000 fpm depending on actuator selection)

Leakage Ratings:

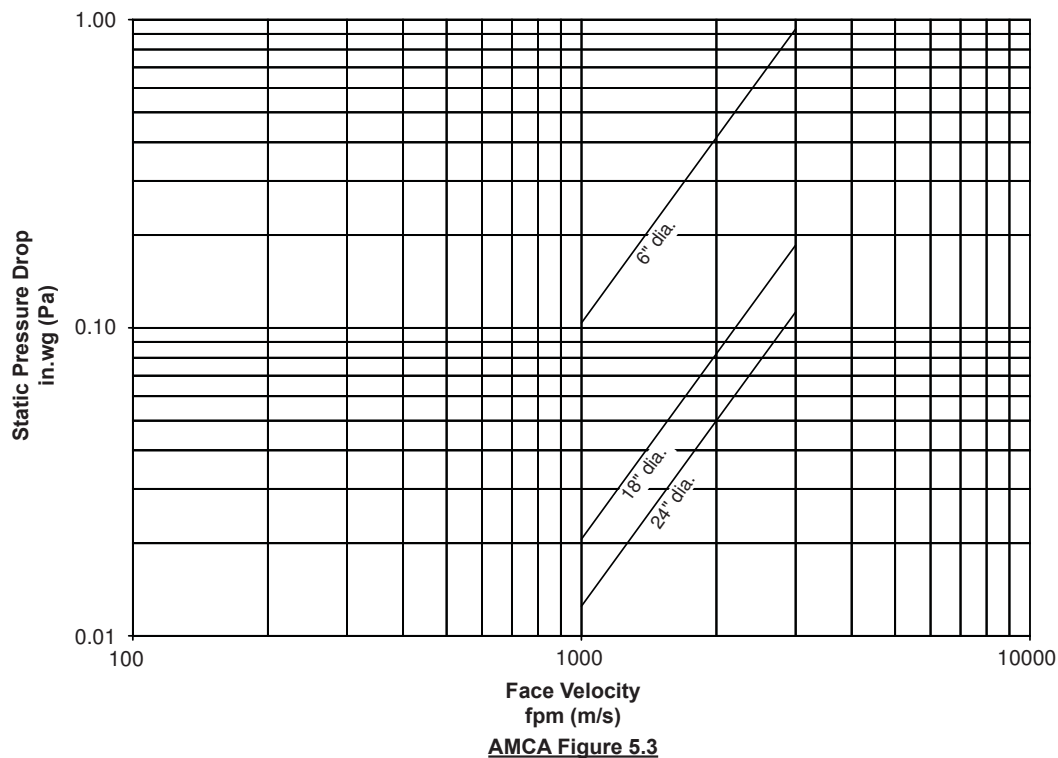
UL Class I
8 cfm per sq. ft. maximum @ 4 in.wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with
AMCA Standard 500D.

MODEL FR1

Class I • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • Combination Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 20-GA galvanized steel flat by 18" long integral sleeve
BLADES: 16-GA galvanized steel single thickness; Parallel action
AXLES: Plated solid steel stub
BEARINGS: Oil impregnated bronze
LINKAGE: Galvanized steel angle interconnect, with plated steel brackets and pivots located on blade
STOPS: 18-GA galvanized steel at head and sill
BLADE SEALS: Silicone
JAMB SEALS: Stainless steel
SLEEVE: Integral 20-GA galvanized steel by 18" long
RETAINING ANGLES: 7/8" x 1 1/2" x 16-GA adjustable perimeter mounting angle
CAULKING: Hardcast Irongrip 601 or UL-listed equivalent
FINISH: Mill on galvanized steel
ACTUATOR: Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Integral Dual Position Indication (IDPI) switches
 Sensotherm re-openable heat response device (ESOT) for electric actuator
 Sensotherm re-openable heat response device (PSOT) for pneumatic actuator
 Model SM-501 Flow-rated smoke detector shipped loose
 Model SM-501 Flow-rated smoke detector mounted and wired (6" minimum damper height with a 20" sleeve - extra 2" on jackshaft side)
 Tab-Lock retaining angles
 Stainless steel bearings
 Copper tubing (for pneumatic actuators)
 Optional 19" or 20" sleeve depth - Additional sleeve length is added to the non-jackshaft side unless ordered with mounted smoke detector and/or < 6"H with B-Pan Transition
 Round or oval transitions
 Short-width (<16") and/or short-height (<6") transitions

NOTES

- "A" width and "B" height are opening dimensions. Damper frames are provided approximately 1/4" undersized.
- Dampers are available in 1" increments only.
- Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.
- The blades must stay in the fire wall. The adjustable retaining angle may only be adjusted the distance shown on the label or installation instructions.

DAMPER SIZES

Orientation	Horizontal & Vertical	
Panels	Minimum Panel	Maximum Panel
Rectangular	4"W x 4"H (16"W x 6"H frame)	24"W x 24"H
Round	4" dia. (16"W x 6"H frame)	22" dia.
Oval	4"W x 4"H (16"W x 6"H frame)	22"W x 22"H

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.
 Dampers < 6"H will have a 20" sleeve with the additional sleeve length on the jackshaft side when a B-Pan type transition is ordered.

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER

FIRE RESISTANCE RATING 1 1/2 HR

LEAKAGE RESISTANCE CLASS I

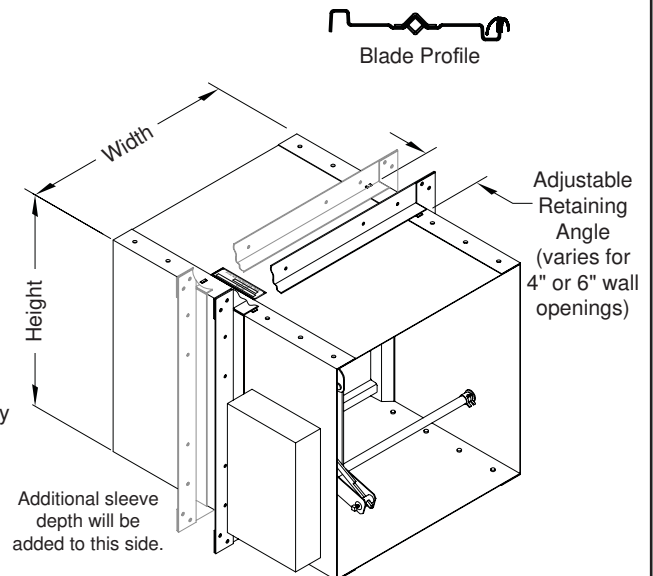
abi air balance

FILE #R4708



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:120
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



MODEL FR1

Class I • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • Combination Fire/Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg
Maximum Velocity: 2000 fpm

Leakage Ratings:

UL Class I
8 cfm per sq. ft. maximum @ 4 in. wg

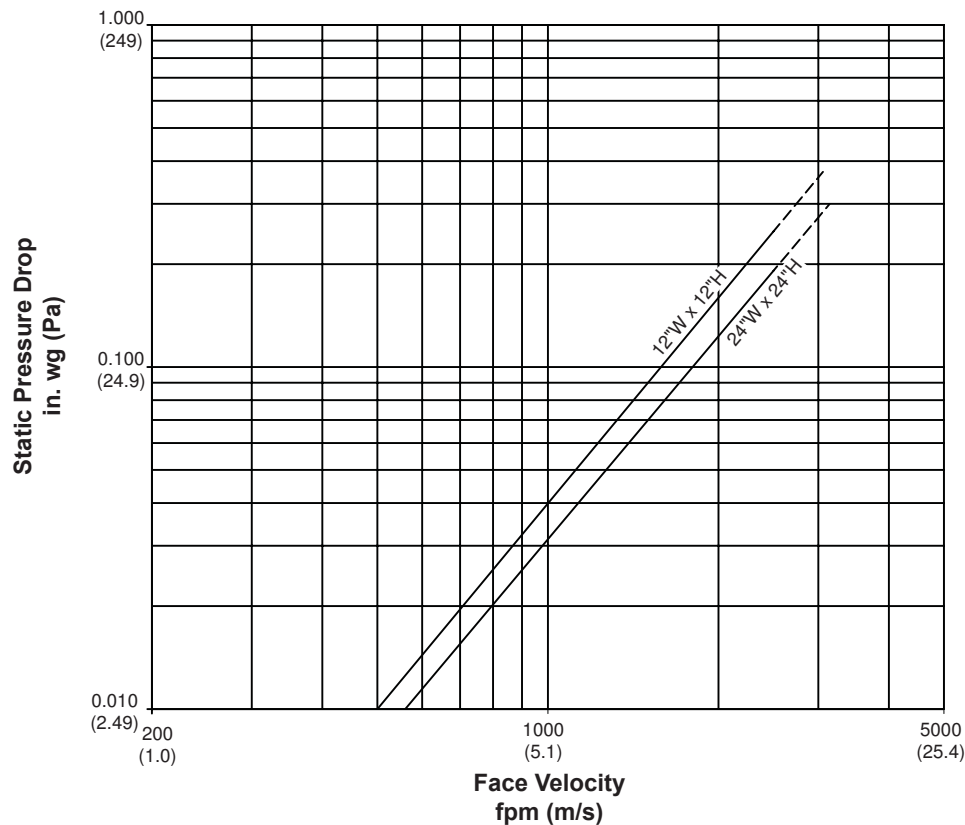
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Damper Size	Noise Criterion (NC)			
	Velocity fpm (m/s)			
	1000 (5.08)	2000 (10.16)	3000 (15.24)	4000 (20.32)
12"W x 12"H (305mm x 305mm)	22dB	44dB	55dB	62dB
24"W x 24"H (610mm x 610mm)	30dB	50dB	62dB	not available

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



AMCA Figure 5.3



Air Balance certifies that the model FR1 damper shown here is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Air Performance Ratings only.

MODEL FR2

Class II • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • Combination Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 20-GA galvanized steel flat by 18" long integral sleeve
BLADES: 16-GA galvanized steel single thickness; Parallel action
AXLES: Plated solid steel stub
BEARINGS: Oil impregnated bronze
LINKAGE: Galvanized steel angle interconnect, with plated steel brackets and pivots located on blade
STOPS: 18-GA galvanized steel at head and sill
BLADE SEALS: Silicone
JAMB SEALS: Stainless steel
SLEEVE: Integral 20-GA galvanized steel by 18" long
RETAINING ANGLES: 7/8" x 1 1/2" x 16-GA adjustable perimeter mounting angle
CAULKING: Hardcast Irongrip 601 or UL-listed equivalent
FINISH: Mill on galvanized steel
ACTUATOR: Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Integral Dual Position Indication (IDPI) switches
 Sensotherm re-openable heat response device (ESOT) for electric actuator
 Sensotherm re-openable heat response device (PSOT) for pneumatic actuator
 Model SM-501 Flow-rated smoke detector ship loose
 Model SM-501 Flow-rated smoke detector mounted and wired (6" minimum damper height with a 20" sleeve - extra 2" on jackshaft side)
 Tab-Lock retaining angles
 Stainless steel bearings
 Copper tubing (for pneumatic actuators)
 Optional 19" or 20" sleeve depth - Additional sleeve length is added to non-jackshaft side unless ordered with mounted smoke detector and/or < 6"H with B-Pan Transition
 Round or oval transitions
 Short-width (<6") and/or short-height (<6") transitions

NOTES

1. "A" width and "B" height are opening dimensions. Damper frames are provided approximately 1/4" undersized.
2. Dampers are available in 1" increments only.
3. Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.
4. The blades must stay in the fire wall. The adjustable retaining angle may only be adjusted the distance shown on the label or installation instructions.

DAMPER SIZES

Orientation	Horizontal & Vertical	
Panels	Minimum Panel	Maximum Panel
Rectangular	4"W x 4"H (6"W x 6"H frame)	24"W x 24"H
Round	4" dia. (6"W x 6"H frame)	22" dia.
Oval	4"W x 4"H (6"W x 6"H frame)	22"W x 22"H

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.
 Dampers < 6"H will have a 20" sleeve with the additional sleeve length on the jackshaft side when a B-Pan type transition is ordered.

UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER

FIRE RESISTANCE RATING 1 1/2 HR
 LEAKAGE RESISTANCE CLASS II

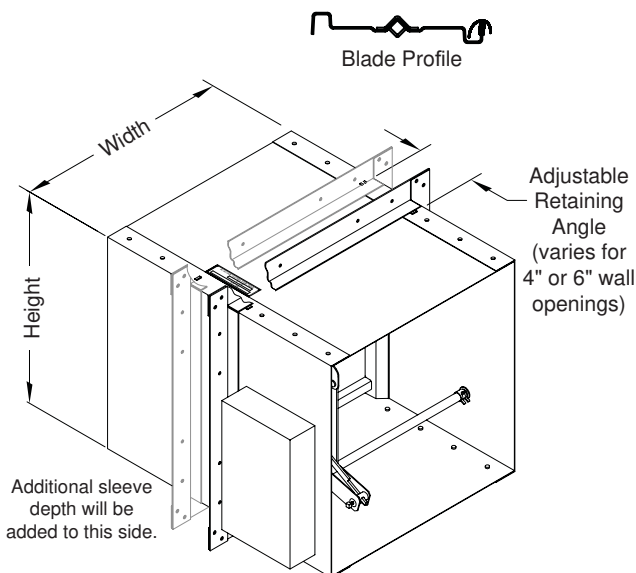
abi air balance

FILE #R4708



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:120
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



MODEL FR2

Class II • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • Combination Fire/Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg

Maximum Velocity: 2000 fpm

Leakage Ratings:

UL Class II

20 cfm per sq. ft. maximum @ 4 in. wg

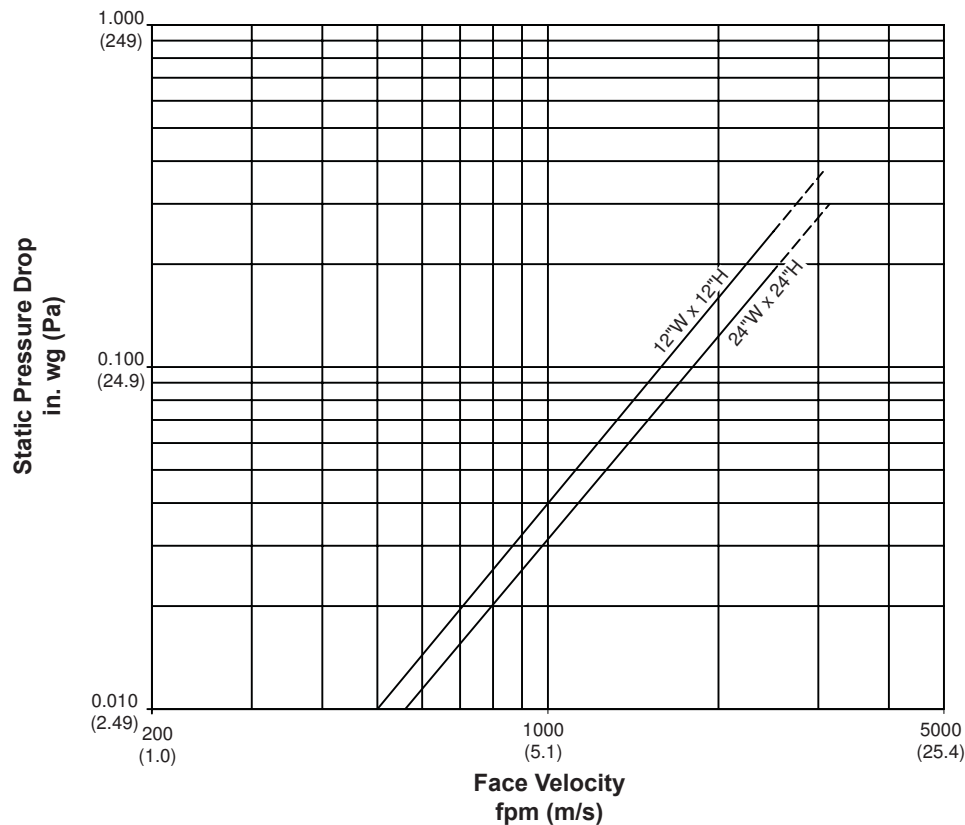
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Damper Size	Noise Criterion (NC)			
	Velocity fpm (m/s)			
	1000 (5.08)	2000 (10.16)	3000 (15.24)	4000 (20.32)
12"W x 12"H (305mm x 305mm)	22dB	44dB	55dB	62dB
24"W x 24"H (610mm x 610mm)	30dB	50dB	62dB	not available

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



AMCA Figure 5.3



Air Balance certifies that the model FR2 damper shown here is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Air Performance Ratings only.



In the interest of product development, Air Balance reserves the right to make changes without notice.

P.O. Box 606 • 7435 Industrial Rd. • Florence, KY 41042 • Phone: (859) 538-3400 • Fax: (859) 647-7810

MODEL FS1

Leakage Class I • 250°F or 350°F • 1½ Hour • Galvanized Steel • Single Thickness Blade • Combination Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7½" x 16-GA galvanized steel hat channel; Flat 16-GA galvanized head and sill for maximum free area on dampers ≤ 13" high
- BLADES:** 16-GA galvanized steel single thickness; Parallel action
- AXLES:** Plated solid steel stub
- BEARINGS:** Oil impregnated bronze
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots, in-jamb type or on-blade type
- STOPS:** 18-GA galvanized steel angles at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA galvanized steel by 18" long (sizes greater than 84" wide or 84" high require minimum 18-GA)
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- ACTUATOR:** Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper
- FINISH:** Mill

OPTIONS

- Exact Size (no undercut)
- Actuators - 120V, 24V, 230V or Pneumatic
- Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
- Dual Position Indication (DPI) Switches
- Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
- Sensotherm Re-Openable Heat Response Device (PSOT) for Pneumatic Actuator
- Model SM-501 Flow-Rated Smoke Detector
- Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
- Momentary Test Switch
- Remote Test Boxes
- Copper Tubing (for Pneumatic Actuators)
- Transformers
- Tab-Lock Retaining Angles - 1 or 2 Sets
- Stainless Steel Bearings
- Stainless Steel Axles
- Security Bars
- Sleeves of Various Depths and Gauge Thickness (restriction apply)
- No Sleeves (restriction apply)
- Round or Oval Transitions
- Short-Width (<8") and/or Short-Height (<6") Transitions

NOTES

- "A" width and "B" height are opening dimensions. Dampers are provided approximately ¼" undersize.
- Damper ≥ 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
- Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
- Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
- Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
FIRE RESISTANCE RATING 1½ HR

abi

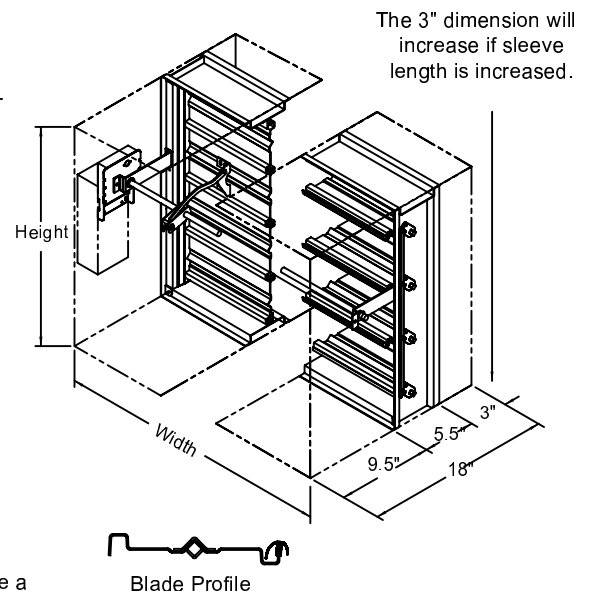
air balance

FILE #R4708



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:119
- New York City MEA Listing # 111-99-M
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



DAMPER SIZES

Orientation	Hor & Vert	2000 fpm, 4 in wg						3000 fpm, 4 in wg		
		Horizontal		Vertical				Hor & Vert	Horizontal	Vertical
Panel	Min Panel	Max Panel 250°/350°	Max Assy 250°/350°	Max Panel 250°	Max Panel 350°	Max Assy 250°	Max Assy 350°	Min Panel 250°	Max Assy 250°	Max Assy 250°
Rectangular	4"W x 4"H (8"W x 6"H frame)	36"W x 48"H	72"W x 48"H	36"W x 48"H 48"W x 36"H	36"W x 48"H	144"W x 70"H	128"W x 62"H	36"W x 36"H	72"W x 36"H	108"W x 36"H
Round	4" dia. (8"W x 6"H frame)	34" Dia.	46" Dia.	34" Dia.	34" Dia.	68" Dia.	60" Dia.	34" Dia.	34" Dia.	34" Dia.
Oval	4"W x 4"H (8"W x 6"H frame)	34"W x 46"H	70"W x 46"H	34"W x 46"H 46"W x 34"H	34"W x 46"H	45 sq. ft. 106"W or	106"W x 60"H	34"W x 34"H	70"W x 34"H	106"W x 34"H

*Dampers smaller than minimum frame size require a transitions. Reference SD-TRFS.

**For sizes smaller than 16"w x 8"h, airfoil blade will be supplied.

MODEL FS1

Leakage Class I • 250°F or 350°F • 1½ Hour • Galvanized Steel • Single Thickness Blade • Combination Fire/Smoke Damper

Operations Rating:

Maximum Differential Pressure: 4 in.wg

Maximum Face Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Rating:

UL Class I

4 cfm per sq.ft. maximum @ 1 in.wg

8 cfm per sq.ft. maximum @ 4 in.wg

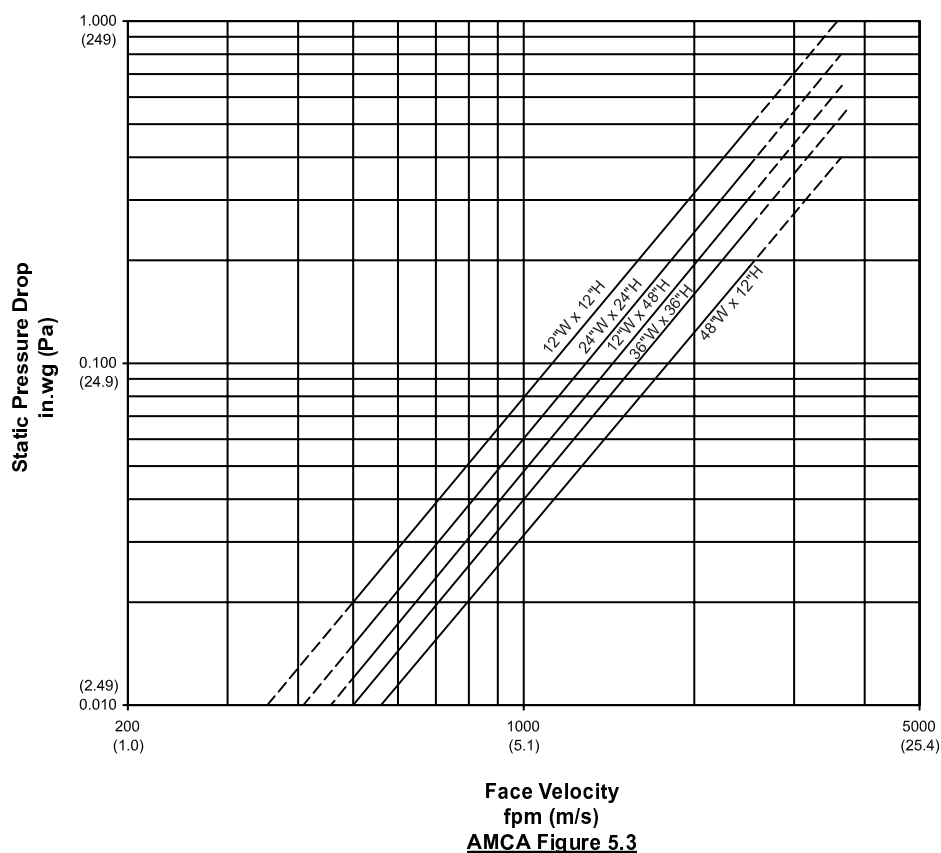
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Damper Size	Noise Criterion (NC)			
	Velocity (fpm)			
	1000	2000	3000	4000
12"W x 12"H	31	53	64	71
24"W x 24"H	33	54	65	n/a

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



Air Balance certifies that the model FS1 damper shown here is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Air Performance Ratings only.

Combination Fire/Smoke Damper: Class I • 250°F • Stainless Steel • Single Thickness Blade**STANDARD MATERIALS AND CONSTRUCTION**

- FRAME:** 5½" x 7⅞" x 16-GA 304 stainless steel hat channel; A flat head and sill are used for sizes thru 13" high
- BLADES:** 16-GA 304 stainless steel single thickness; Parallel action
- AXLES:** 304 stainless steel stub
- BEARINGS:** Stainless steel
- LINKAGE:** 304 stainless steel angle and crank plates with stainless steel pivots; In-jamb type
- STOPS:** 18-GA 304 stainless steel at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA 304 stainless steel by 18" long
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- FINISH:** Mill on 304 stainless steel
- ACTUATOR:** Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Type 316 Stainless Steel (where available)
 External right hand actuator mounting location
 Integral Dual Position Indication (IDPI) switches
 Sensotherm re-openable heat response device (ESOT) for electric actuator
 Sensotherm re-openable heat response device (PSOT) for pneumatic actuator
 Model SM-501 Flow-rated smoke detector (10" minimum damper height)
 Tab-Lock retaining angles
 Copper tubing (for pneumatic actuators)
 Sleeves of various depths and gauge thicknesses
 Round or oval transitions
 Short-width (<16") and/or short-height (<8") transitions

NOTES

1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve will increase the size of the assembly.
2. Damper with smoke detector must have a minimum sleeve of 19" (10.5" on the actuator side and 3" on the non-actuator side).
3. Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.
4. On dampers with all internal actuators, minimum height for factory mounted smoke detectors to be 14".

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER

FIRE RESISTANCE RATING 1½ HR

LEAKAGE RESISTANCE CLASS I

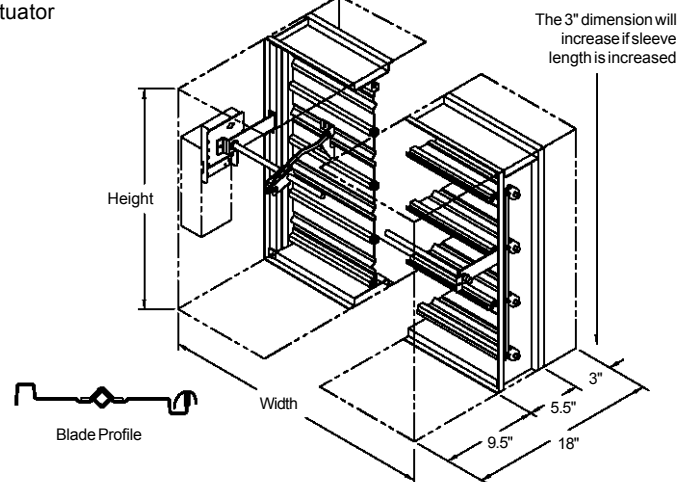
abi air balance

FILE #R4708



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A,
- ICC's International Building Code
- New York City MEA Listing #111-99-M
- California State Fire Marshal Listing #3225-1328:119
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.

**DAMPER SIZES**

Orientation	Hor & Ver	2000 fpm 4 in.wg			3000 fpm 4 in.wg		
		Horizontal	Vertical		Horizontal	Vertical	
Panels	Min Panel	Max Panel	Max Panel	Max Assy	Max Panel	Max Panel	Max Assy
Rectangular	4"W 4"H (16"W x 8"H frame)	24"W x 24"H	36"W x 32"H	108"W x 32"H	24"W x 24"H	36"W x 32"H	108"W x 32"H
Round	4" dia. (16"W x 8"H frame)	22" dia.	30" dia.	not available	22" dia.	30" dia.	not available
Oval	4"W x 4"H (16"W x 8"H frame)	22"W x 22"H	34"W x 30"H	106"W x 30"H	22"W x 22"H	34"W x 30"H	106"W x 30"H

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.

Combination Fire/Smoke Damper: Class I • 250°F • Stainless Steel • Single Thickness Blade**Operations Ratings:**

Maximum Differential Pressure: 4 in. wg

Maximum Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class I

4 cfm per sq. ft. maximum @ 1 in. wg

8 cfm per sq. ft. maximum @ 4 in. wg

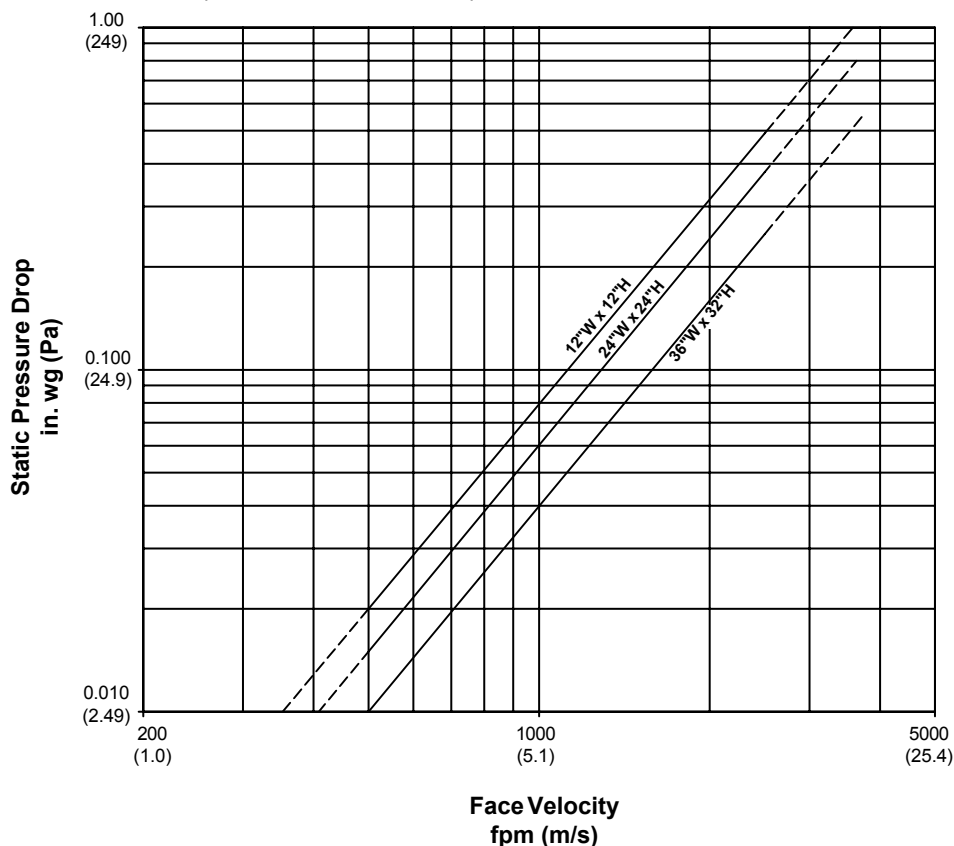
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Noise Criterion (NC)				
Damper	Velocity (fpm)			
Size	1000	2000	3000	4000
12"W x 12"H (305mm x 305mm)	31	53	64	71
24"W x 24"H (610mm x 610mm)	33	54	65	not available

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with
AMCA Standard 500D.

**Face Velocity
fpm (m/s)**
AMCA Figure 5.3

MODEL FS2

Leakage Class II • 250°F or 350°F • 1½ Hour • Galvanized Steel • Single Thickness Blade • Combination Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7/8" x 16-GA galvanized steel hat channel; Flat 16-GA galvanized head and sill for maximum free area on dampers ≤ 13" high
- BLADES:** 16-GA galvanized steel single thickness; Parallel action
- AXLES:** Plated solid steel stub
- BEARINGS:** Oil impregnated bronze
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots, in-jamb type or on-blade type
- STOPS:** 18-GA galvanized steel angles at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA galvanized steel by 18" long (sizes greater than 84" wide or 84" high require minimum 18-GA)
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- ACTUATOR:** Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper
- FINISH:** Mill

OPTIONS

- Exact Size (no undercut)
- Actuators - 120V, 24V, 230V or Pneumatic
- Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
- Dual Position Indication (IDPI) Switches
- Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
- Sensotherm Re-Openable Heat Response Device (PSOT) for Pneumatic Actuator
- Model SM-501 Flow-Rated Smoke Detector
- Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
- Momentary Test Switch
- Remote Test Boxes
- Copper Tubing (for Pneumatic Actuators)
- Transformers
- Tab-Lock Retaining Angles - 1 or 2 Sets
- Stainless Steel Bearings
- Stainless Steel Axles
- Security Bars
- Sleeves of Various Depths and Gauge Thickness (restriction apply)
- No Sleeves (restriction apply)
- Round or Oval Transitions
- Short-Width (<8") and/or Short-Height (<6") Transitions


NOTES

- "A" width and "B" height are opening dimensions. Dampers are provided approximately ¼" undersize.
- Damper ≥ 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
- Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
- Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
- Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

DAMPER SIZES

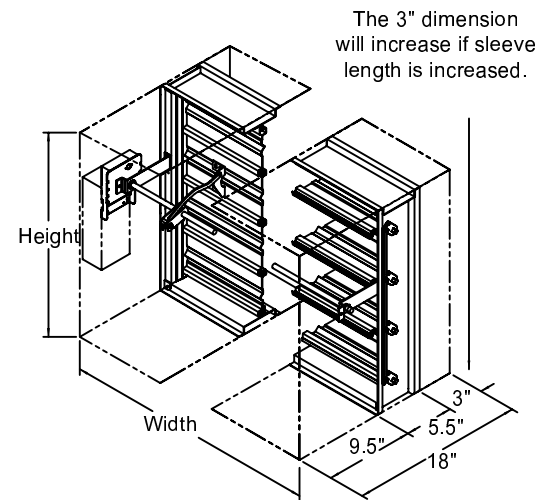
		2000 fpm, 4 in.wg						3000 fpm, 4 in.wg		
Orientation	Hor & Vert	Horizontal		Vertical				Hor & Vert	Horizontal	Vertical
Panels	** Minimum Panel	Max Panel 250°/350°	Max Assy 250°/350°	Max Panel 250°	Max Panel 350°	Max Assy 250°	Max Assy 350°	Max Panel 250°	Max Assy 250°	Max Assy 250°
Rectangular	4"W x 4"H (8"W x 6"H frame)	36"W x 48"H	72"W x 48"H	36"W x 48"H 48"W x 36"H	36"W x 48"H	144"W x 70"H	128"W x 62"H	36"W x 36"H	72"W x 36"H	108"W x 36"H
Round	4" dia. (8"W x 6"H frame)	34" dia.	46" dia.	34" dia.	34" dia.	68" dia.	60" dia.	34" dia.	34" dia.	34" dia.
Oval	4"W x 4"H (8"W x 6"H frame)	34"W x 46"H	70"W x 46"H	34"W x 46"H 46"W x 34"H	34"W x 46" H	45 sq.ft 106"W or 68"H	106"W x 60"H	34"W x 34"H	70"W x 34"H	106"W x 34"H

UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
 FIRE RESISTANCE RATING 1½ HR
 LEAKAGE RESISTANCE CLASS II

abi air balance **FILE #R4708** 

This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:119
- New York City MEA Listing # 111-99-M
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



Blade Profile

MODEL FS2

Leakage Class II • 250°F or 350°F • 1½ Hour • Galvanized Steel • Single Thickness Blade • Combination Fire/Smoke Damper

Operations Rating:

Maximum Differential Pressure: 4 in.wg

Maximum Face Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Rating:

UL Class II

10 cfm per sq.ft. maximum @ 1 in.wg

20 cfm per sq.ft. maximum @ 4 in.wg

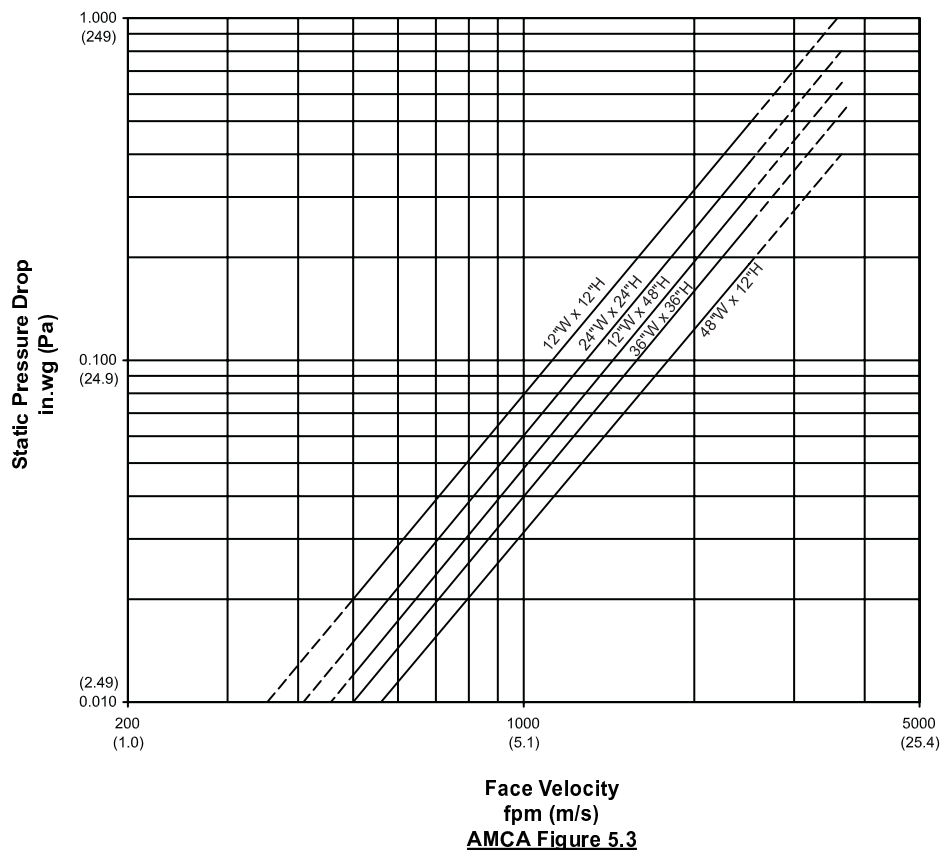
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Damper Size	Noise Criterion (NC)			
	Velocity (fpm)			
	1000	2000	3000	4000
12"W x 12"H	31	53	64	71
24"W x 24"H	33	54	65	n/a

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



Air Balance certifies that the model FS2 damper shown here is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Air Performance Ratings only.

MODEL FS2

Leakage Class II • 250°F or 350°F • 1½ Hour • Galvanized Steel • Single Thickness Blade • Combination Fire/Smoke Damper

Operations Rating:

Maximum Differential Pressure: 4 in.wg

Maximum Face Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Rating:

UL Class II

10 cfm per sq.ft. maximum @ 1 in.wg

20 cfm per sq.ft. maximum @ 4 in.wg

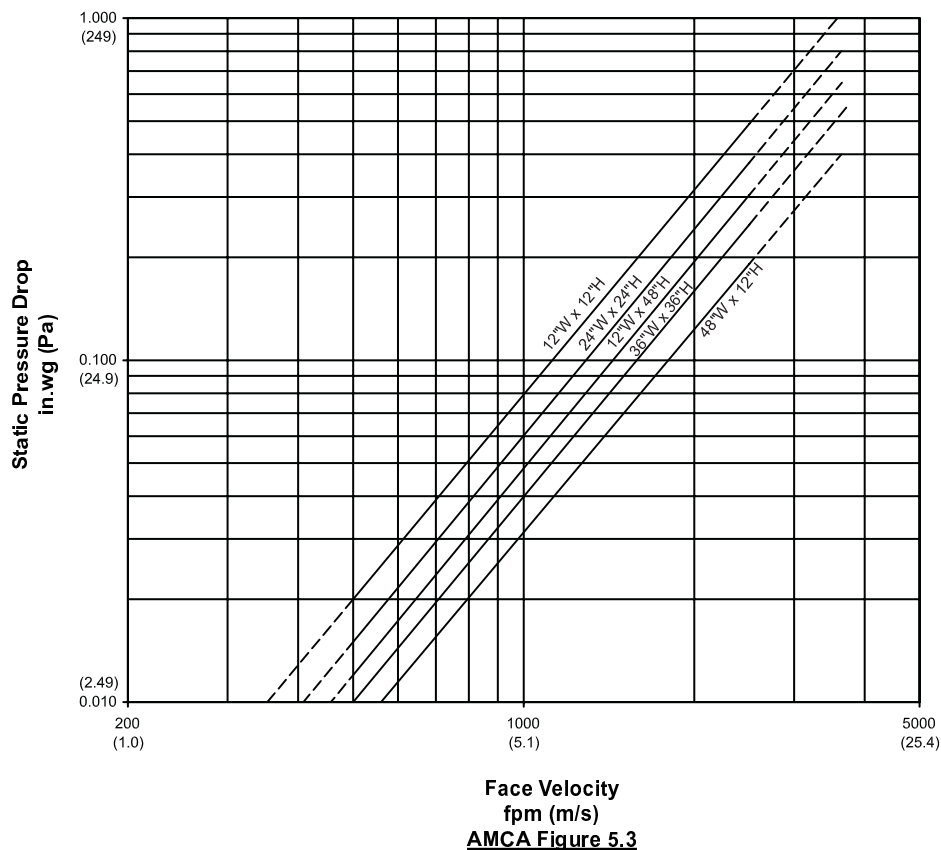
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Damper Size	Noise Criterion (NC)			
	Velocity (fpm)			
	1000	2000	3000	4000
12"W x 12"H	31	53	64	71
24"W x 24"H	33	54	65	n/a

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



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Combination Fire/Smoke Damper: Class II • 250°F or 350°F • Stainless Steel • Single Thickness Blade

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5 1/2" x 7/8" x 16-GA 304 stainless steel hat channel; A flat head and sill are used for sizes thru 13" high
- BLADES:** 16-GA 304 stainless steel single thickness; Parallel action
- AXLES:** 304 stainless steel stub
- BEARINGS:** Stainless steel
- LINKAGE:** 304 stainless steel angle and crank plates with stainless steel pivots; In-jamb type
- STOPS:** 18-GA 304 stainless steel at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA 304 stainless steel by 18" long
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- FINISH:** Mill on 304 stainless steel
- ACTUATOR:** Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Type 316 Stainless Steel (where available)

External right hand actuator mounting location

Integral Dual Position Indication (IDPI) switches

Sensotherm re-openable heat response device (ESOT) for electric actuator

Sensotherm re-openable heat response device (PSOT) for pneumatic actuator

Model SM-501 Flow-rated smoke detector (10" minimum damper height)

Tab-Lock retaining angles

Copper tubing (for pneumatic actuators)

Sleeves of various depths and gauge thicknesses

Round or oval transitions

Short-width (<8") and/or short-height (<8") transitions

NOTES

1. Damper frames are provided approximately 1/4" undersized. The addition of a sleeve will increase the size of the assembly.
2. damper with smoke detector must have a minimum sleeve of 19" (10.5" on the actuator side and 3" on the non-actuator side).
3. Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.
4. On dampers with all internal actuators, minimum height for factory mounted smoke detectors to be 14"

DAMPER SIZES

Orientation	Hor & Ver	2000 fpm 4 in.wg			3000 fpm 4 in.wg		
		Horizontal	Vertical		Horizontal	Vertical	
Panels	Min Panel	Max Panel	Max Panel	Max Assy	Max Panel	Max Panel	Max Assy
Rectangular	4"W 4"H (8"W x 8"H frame)	24"W x 24"H	36"W x 32"H	108"W x 32"H	24"W x 24"H	36"W x 32"H	108"W x 32"H
Round	4" dia. (8"W x 8"H frame)	22" dia.	30" dia.	not available	22" dia.	30" dia.	not available
Oval	4"W x 4"H (8"W x 8"H frame)	22"W x 22"H	34"W x 30"H	106"W x 30"H	22"W x 22"H	34"W x 30"H	106"W x 30"H

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER

FIRE RESISTANCE RATING 1 1/2 HR

LEAKAGE RESISTANCE CLASS II

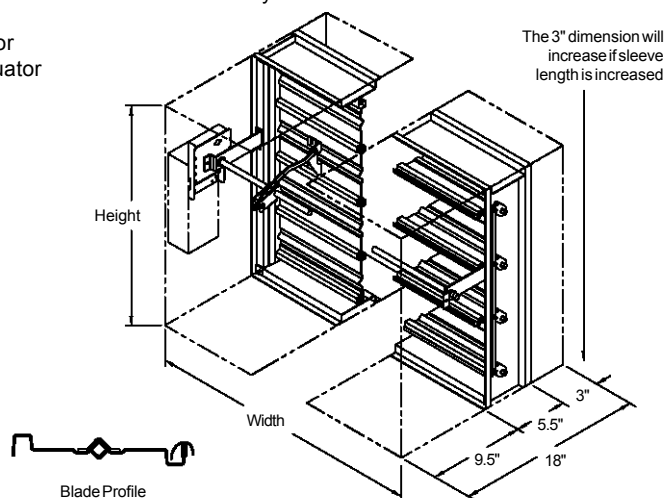
abi air balance

FILE #R4708



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- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #111-99-M
- California State Fire Marshal Listing #3225-1328:119
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- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



Combination Fire/Smoke Damper: Class II • 250°F or 350°F • Stainless Steel • Single Thickness Blade

Operations Ratings:

Maximum Differential Pressure: 4 in. wg

Maximum Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class II

10 cfm per sq. ft. maximum @ 1 in. wg

20 cfm per sq. ft. maximum @ 4 in. wg

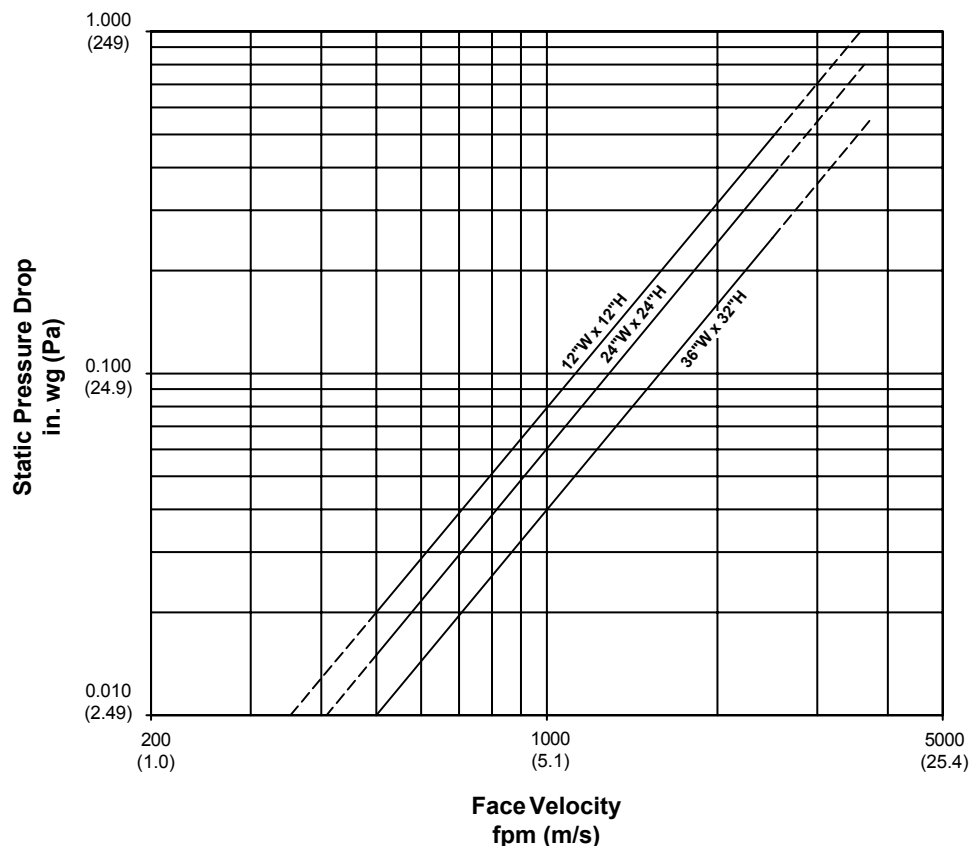
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Noise Criterion (NC)				
Damper	Velocity (fpm)			
Size	1000	2000	3000	4000
12"W x 12"H (305mm x 305mm)	31	53	64	71
24"W x 24"H (610mm x 610mm)	33	54	65	not available

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with
AMCA Standard 500D.

AMCA Figure 5.3

MODEL FT1

Class I • 250°F or 350°F • 3 Hour • Galvanized Steel • Single Thickness Blade • Combination Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x ⅞" x 16-GA galvanized steel hat channel; Flat 16-GA galvanized head and sill for maximum free area on dampers ≤ 13" high
- BLADES:** 16-GA galvanized steel single thickness; Parallel action
- AXLES:** Plated solid steel stub
- BEARINGS:** Oil impregnated bronze
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots, in-jamb type or on-blade type
- STOPS:** 18-GA galvanized steel angles at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA galvanized steel by 18" long (sizes greater than 84" wide or 84" high require minimum 18-GA)
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- ACTUATOR:** Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper
- FINISH:** Mill

OPTIONS

Exact Size (no undercut)
Sleeve - Transition
Actuators - 120V, 24V, 230V or Pneumatic
Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
Integral Dual Position Indication (IDPI) Switches
Sensotherm Re-Openable Heat Response Device for Electric Actuator (ESOT)
Sensotherm Re-Openable Heat Response Device for Pneumatic Actuator (PSOT)
Model SM-501 Flow-Rated Smoke Detector.
Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
Remote Test Box
Copper Tubing (for Pneumatic Actuators)
Transformers
Tab-Lock Retaining Angles - 1 or 2 Sets
Bearings - Stainless Steel
Axle - Stainless Steel
Security Bars
Short-Width (<8") and/or Short-Height (<6") Transitions

NOTES

- "A" width and "B" height are opening dimensions. Dampers are provided approximately ¼" undersize.
- Damper ≥ 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
- Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
- Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
- Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.


DAMPER SIZES

Orientation	Hor & Vert	2000 fpm, 4 in.wg				3000 fpm, 4 in.wg		
		Horizontal		Vertical		Hor & Vert	Horizontal	Vertical
Panels	** Minimum Panel	Max Panel	Max Assy	Max Panel	Max Assy	Max Panel 250°	Max Assy 250°	Max Assy 250°
Rectangular	4"W x 4"H (8"W x 6"H frame)	30"W x 48"H 36"W x 30"H	60"W x 48"H	36"W x 48"H 42"W x 36"H	108"W x 48"H	36"W x 36"H	60"W x 36"H	108"W x 36"H
Round	4" dia. (8"W x 6"H frame)	28" dia.	47" dia.	34" dia.	46" dia.	34" dia.	34" dia.	34" dia.
Oval	4"W x 4"H (8"W x 6"H frame)	28"W x 46"H 34"W x 28"H	58"W x 47"H	34"W x 46"H 40"W x 34"H	106"W x 46"H	34"W x 34"H	58"W x 34"H	106"W x 34"H

* Dampers smaller than minimum frame size require a transitions. Reference SD-TRFS.

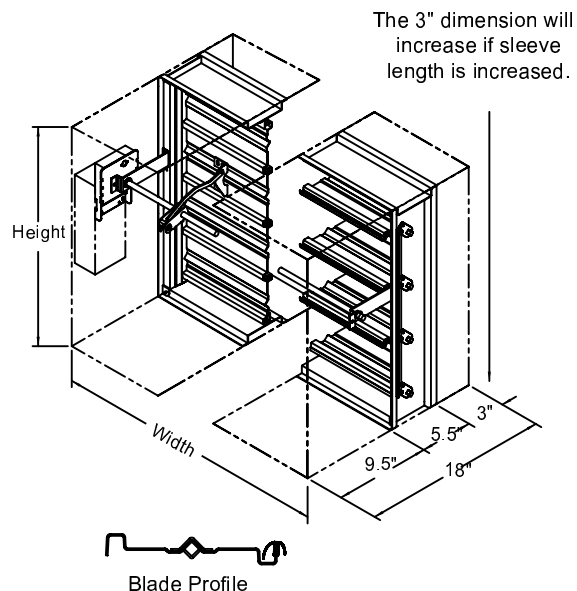
** For sizes smaller than 16"W x 8"H, airfoil blades will be supplied.

UNDERWRITERS LABORATORIES INC.®
CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
FIRE RESISTANCE RATING 3 HR
LEAKAGE RESISTANCE CLASS I

abi air balance **FILE #R4708** 

This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:115
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of 3 hours and longer
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detections system.



MODEL FT1

Class I • 250°F or 350°F • 3 Hour • Galvanized Steel • Single Thickness Blade • Combination Fire/Smoke Damper

Operations Rating:

Maximum Differential Pressure: 4 in.wg

Maximum Face Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Rating:

UL Class I

4 cfm per sq.ft. maximum @ 1 in.wg

8 cfm per sq.ft. maximum @ 4 in.wg

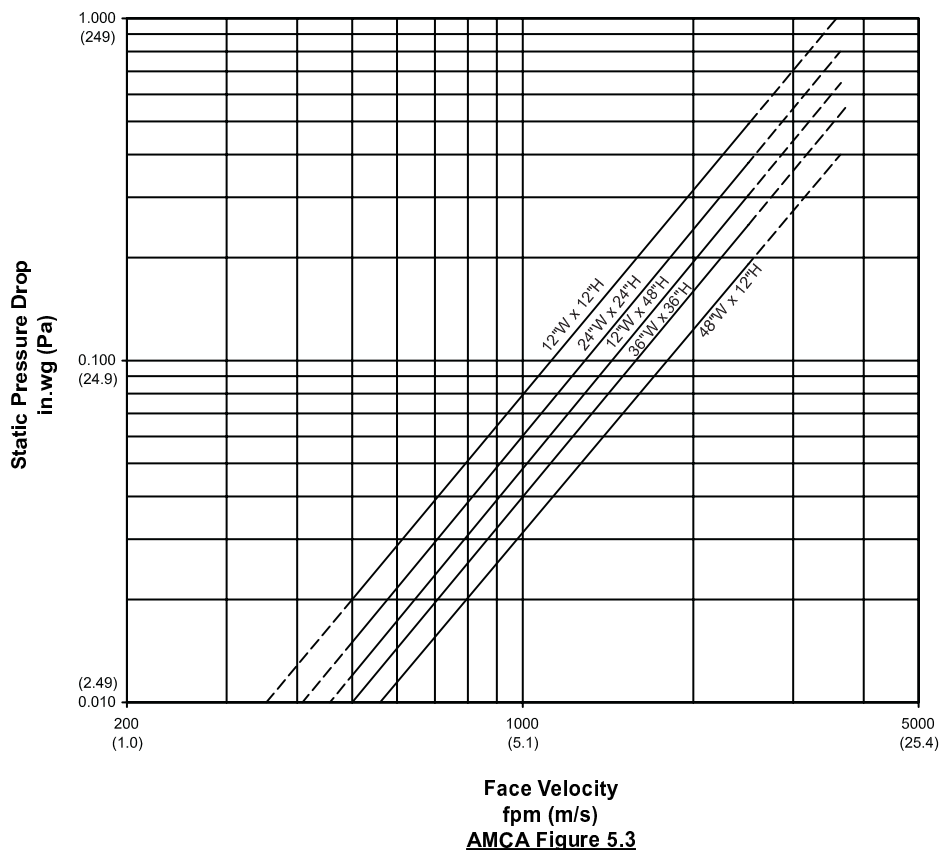
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Damper Size	Noise Criterion (NC)			
	Velocity (fpm)			
	1000	2000	3000	4000
12"W x 12"H	31	53	64	71
24"W x 24"H	33	54	65	n/a

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with AMCA
Standard 500D.

Face Velocity
fpm (m/s)
AMCA Figure 5.3

MODEL FT2

Class II • 250°F or 350°F • 3 Hour • Galvanized Steel • Single Thickness Blade • Combination Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7/8" x 16-GA galvanized steel hat channel; Flat 16-GA galvanized head and sill for maximum free area on dampers ≤ 13" high
- BLADES:** 16-GA galvanized steel single thickness; Parallel action
- AXLES:** Plated solid steel stub
- BEARINGS:** Oil impregnated bronze
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots, in-jamb type or on-blade type
- STOPS:** 18-GA galvanized steel angles at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA galvanized steel by 18" long (sizes greater than 84" wide or 84" high require minimum 18-GA)
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- ACTUATOR:** Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper
- FINISH:** Mill

OPTIONS

Exact Size (no undercut)

Actuators - 120V, 24V, 230V or Pneumatic

Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)

Dual Position Indication (DPI) Switches

Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator

Sensotherm Re-Openable Heat Response Device (PSOT) for Pneumatic Actuator

Model SM-501 Flow-Rated Smoke Detector

Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)

Momentary Test Switch

Remote Test Boxes

Copper Tubing (for Pneumatic Actuators)

Transformers

Tab-Lock Retaining Angles - 1 or 2 Sets

Stainless Steel Bearings

Stainless Steel Axles

Security Bars

Sleeves of Various Depths and Gauge Thickness (restriction apply)

No Sleeves (restriction apply)


Round or Oval Transitions

Short-Width (<8") and/or Short-Height (<6") Transitions

NOTES

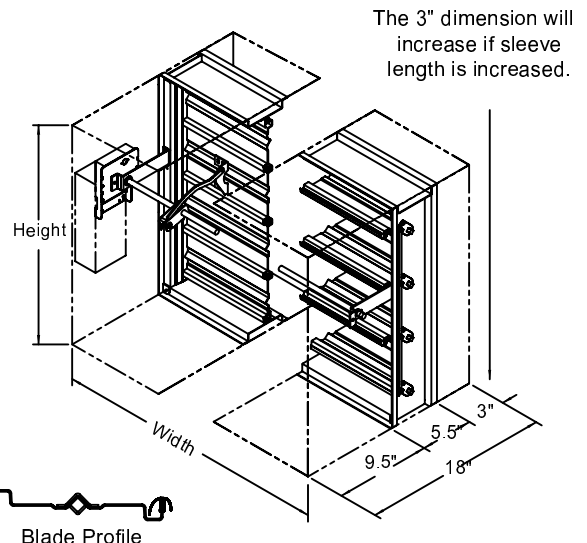
- "A" width and "B" height are opening dimensions. Dampers are provided approximately ¼" undersize.
- Damper ≥ 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
- Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
- Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
- Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
 FIRE RESISTANCE RATING 3 HR
 LEAKAGE RESISTANCE CLASS II

abi air balance **FILE #R4708** 

This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3225-1328:115
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of 3 hours and longer
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detections system.



DAMPER SIZE

		2000 fpm, 4 in.wg				3000 fpm, 4 in.wg		
Orientation	Hor & Vert	Horizontal		Vertical		Hor & Vert	Horizontal	Vertical
Panels	** Minimum Panel	Max Panel	Max Assy	Max Panel	Max Assy	Max Panel 250°	Max Assy 250°	Max Assy 250°
Rectangular	4"W x 4"H (8"W x 6"H frame)	30"W x 48"H 36"W x 30"H	60"W x 48"H	36"W x 48"H 42"W x 36"H	108"W x 48"H	36"W x 36"H	60"W x 36"H	108"W x 36"H
Round	4" dia. (8"W x 6"H frame)	28" dia.	47" dia.	34" dia.	46" dia.	34" dia.	34" dia.	34" dia.
Oval	4"W x 4"H (8"W x 6"H frame)	28"W x 46"H 34"W x 28"H	58"W x 47"H	34"W x 46"H 40"W x 34"H	106"W x 46"H	34"W x 34"H	58"W x 34"H	106"W x 34"H

MODEL FT2

Class II • 250°F or 350°F • 3 Hour • Galvanized Steel • Single Thickness Blade • Combination Fire/Smoke Damper

Operations Rating:

Maximum Differential Pressure: 4 in.wg

Maximum Face Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Rating:

UL Class II

10 cfm per sq.ft. maximum @ 1 in.wg

20 cfm per sq.ft. maximum @ 4 in.wg

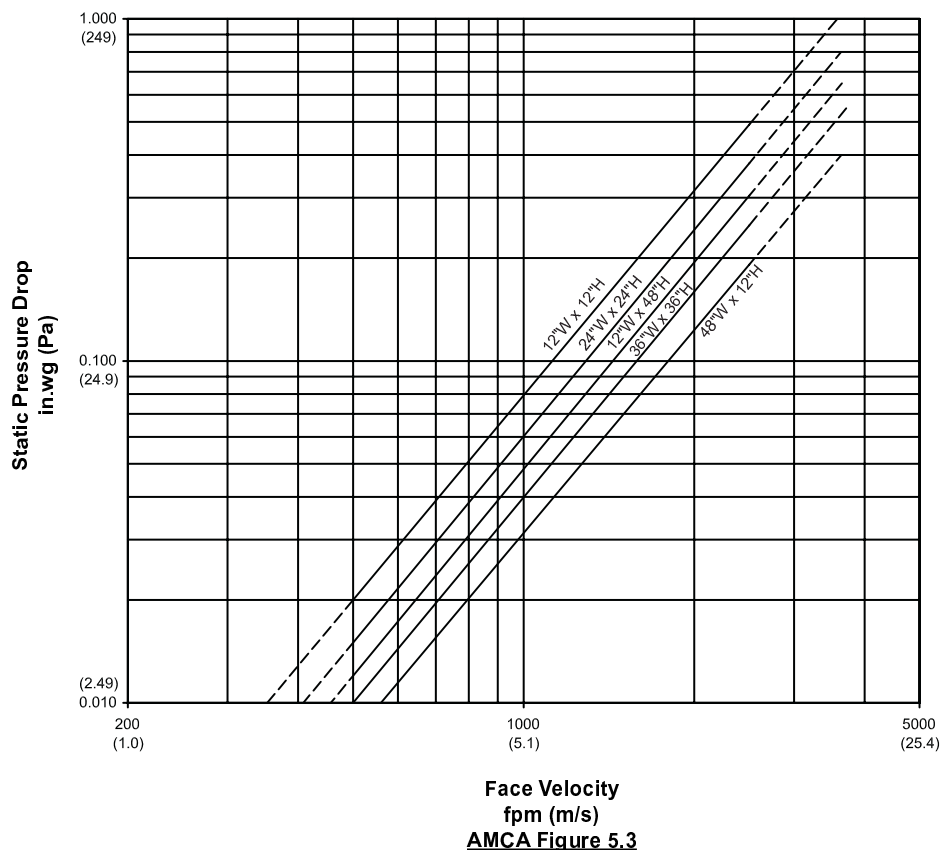
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Damper Size	Noise Criterion (NC)			
	Velocity (fpm)			
	1000	2000	3000	4000
12"W x 12"H	31	53	64	71
24"W x 24"H	33	54	65	n/a

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with AMCA
Standard 500D.

Leakage Class I • Airfoil Blade • 1½ Hour • 250°F or 350°F • Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7/8" x 16-GA galvanized steel hat channel; A flat head and sill are used for sizes thru 13" high
- BLADES:** 20-GA galvanized steel double skinned (equal to 14-GA); Parallel action
- AXLES:** Plated solid steel stub
- BEARINGS:** Oil impregnated bronze
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots; In-jamb type
- STOPS:** 18-GA galvanized steel at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA galvanized steel by 18" long
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- FINISH:** Mill on galvanized steel
- ACTUATOR:** Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Exact Size (no undercut)

Actuators - 120V, 24V, 230V or Pneumatic

Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)

Dual Position Indication (DPI) Switches

Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator

Sensotherm Re-Openable Heat Response Device (PSOT) for Pneumatic Actuator

Model SM-501 Flow-Rated Smoke Detector

Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)

Momentary Test Switch

Remote Test Box

Transformers

Tab-Lock Retaining Angles

Stainless Steel Bearings

Stainless Steel Axles

Security Bars

Copper Tubing (for Pneumatic Actuators)

Sleeves of Various Depths and Gauge Thicknesses (restriction apply)

No Sleeves (restriction apply)

Round or Oval Transitions

Short-Width (<8") and/or Short-Height (<6") Transitions

NOTES


1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve will increase the size of the assembly.
2. Damper ≥ 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
3. Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20 deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
4. Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
5. Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

DAMPER SIZES

Orientation	Horz. & Vert.	** 2,000 fpm & 4 in. wg			
		Horizontal (floor)		Vertical (wall)	
Panels	Min. Panel	Max. Panel	Max. Assy	Max. Panel	Max. Assy
Rectangular	4"W x 4"H (8"W x 6"H frame)	32"W x 48"H	96"W x 96"H	32"W x 48"H	128"W x 96"H
Round	4" dia. (8"W x 6"H frame)	30" dia.	81" dia.	30" dia.	81" dia.
Oval	4"W x 4"H (8"W x 6"H frame)	30"W x 46"H	70"W x 94"H or 94"W x 70"H	30"W x 46"H	70"W x 94"H or 94"W x 70"H

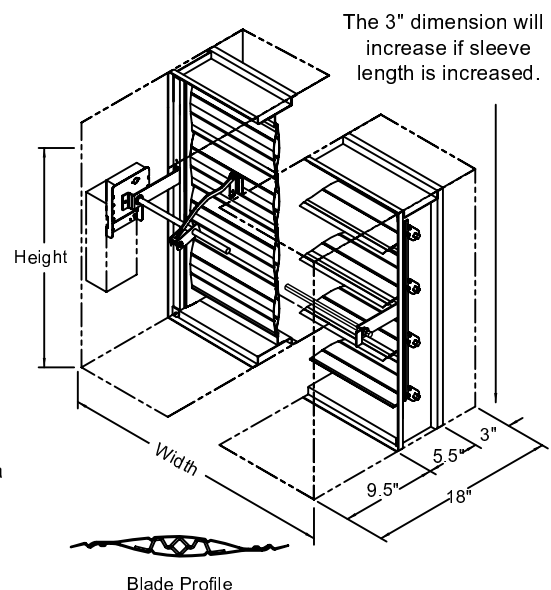
UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
 FIRE RESISTANCE RATING 1½ HR
 LEAKAGE RESISTANCE CLASS I

abi air balance **FILE #R4708**



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #111-99-M
- California State Fire Marshal Listing #3225-1328:118
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



Leakage Class I • Airfoil Blade • 1½ Hour • 250°F or 350°F • Fire/Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg (6 in. wg for selected size/actuators combinations)

Maximum Velocity: 2000 fpm (4000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class I

4 cfm per sq. ft. maximum @ 1 in. wg

8 cfm per sq. ft. maximum @ 4 in. wg

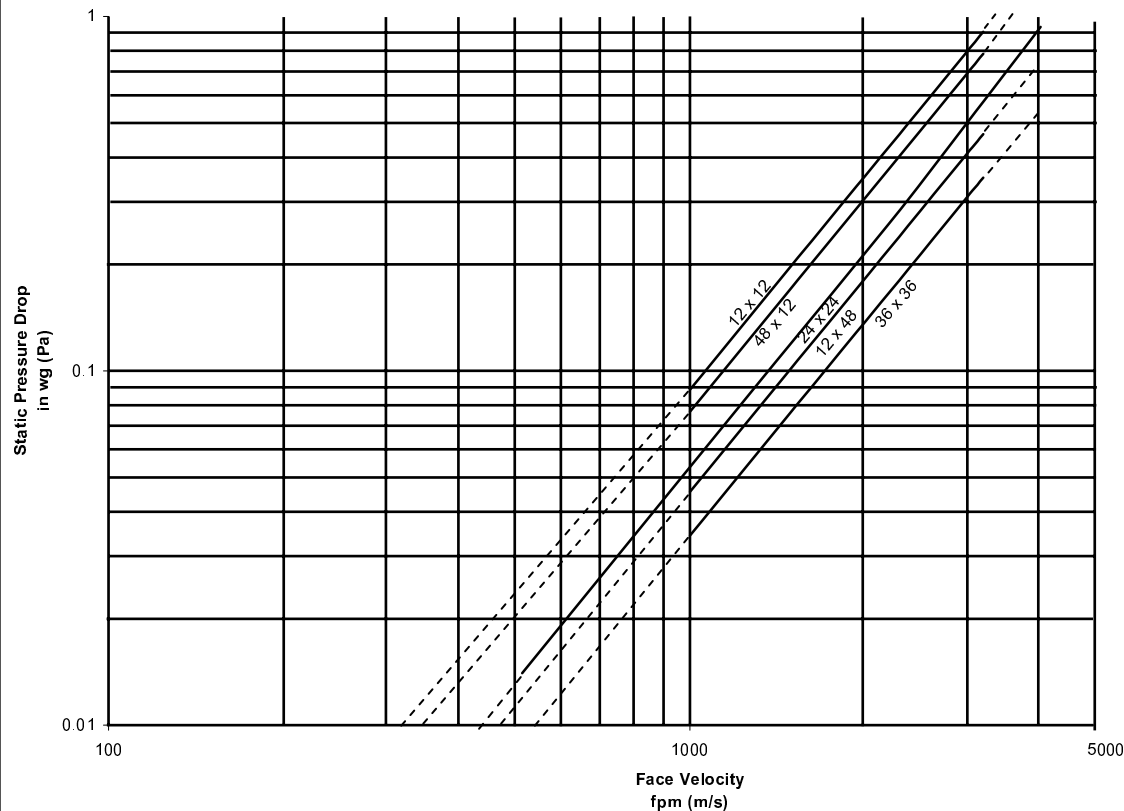
9.8 cfm per sq. ft. maximum @ 6 in. wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The Pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.

FA Pressure Drop**AMCA FIGURE 5.3**

Air Balance certifies that the model FA1 damper shown here is licensed to bear the AMA Seal. The ratings shown are based on tests and procedures performed in accordance with AMA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to the Air Performance Ratings only.

ADDENDUM SD-FA1-13-08
Extended Pressure & Velocity Ratings**FA1 Extended Pressure & Velocity Ratings**

Damper Style	Temp Rating (°F)	Velocity & Pressure	Horizontal & Vertical Min Panel	Horizontal (floor mount)		Vertical (wall mount)	
				Max Panel	Max Assy	Max Panel	Max Assy
No Transition	250° - or - 350°	2000 fpm, 4" w.g.	8" x 6" frame	32" x 48" frame	96" x 96" frame	32" x 48" frame	128" x 96" frame
		3000 fpm, 4" w.g.		24" x 36" frame - or - 32" x 24" frame	96" x 72" frame	24" x 36" frame - or - 32" x 24" frame	96" x 72" frame
		4000 fpm, 4" w.g.		24" x 36" frame - or - 32" x 24" frame	96" x 36" frame	24" x 36" frame - or - 32" x 24" frame	96" x 36" frame
		4000 fpm, 6" w.g. (external act only for 350°)		16" x 24" frame	n/a	16" x 24" frame	n/a
C-Round - or - C-Square	250° - or - 350°	2000 fpm, 4" w.g.	4" dia. duct - or - 4" x 4" duct (8" x 6" frame)	30" dia. duct - or - 30" x 30" duct	81" dia. duct - or - 81" x 81" duct	30" dia. duct - or - 30" x 30" duct	81" dia. duct - or - 81" x 81" duct
		3000 fpm, 4" w.g.		22" dia. duct - or - 22" x 22" duct	70" dia. duct - or - 70" x 70" duct	22" dia. duct - or - 22" x 22" duct	70" dia. duct - or - 70" x 70" duct
		4000 fpm, 4" w.g.		22" dia. duct - or - 22" x 22" duct	34" dia. duct - or - 34" x 34" duct	22" dia. duct - or - 22" x 22" duct	34" dia. duct - or - 34" x 34" duct
		4000 fpm, 6" w.g. (external act only for 350°)		14" dia. duct - or - 14" x 14" duct	n/a	14" dia. duct - or - 14" x 14" duct	n/a
C-Oval - or - C-Rectangle	250° - or - 350°	2000 fpm, 4" w.g.	4" x 4" duct (8" x 6" frame)	30" x 46" duct	70" x 94" duct - or - 94" x 70" duct	30" x 46" duct	70" x 94" duct - or - 94" x 70" duct
		3000 fpm, 4" w.g.		22" x 34" duct - or - 30" x 22" duct	94" x 70" duct	22" x 34" duct - or - 30" x 22" duct	94" x 70" duct
		4000 fpm, 4" w.g.		22" x 34" duct - or - 30" x 22" duct	94" x 34" duct	22" x 34" duct - or - 30" x 22" duct	94" x 34" duct
		4000 fpm, 6" w.g. (external act only for 350°)		14" x 22" duct	n/a	14" x 22" duct	n/a

all dimensions are shown as width x height
for **NO TRANSITION**, order size = frame size = duct size
unless otherwise noted, duct size = order size

WITH TRANSITIONS, damper **frame** size = order width + 2" x order height + 2"

Leakage Class II • 1½ Hour • Airfoil Blade • 250°F or 350°F • Galvanized Steel Airfoil Blade Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME:	5½" x 7⁄8" x 16-GA galvanized steel hat channel; A flat head and sill are used for sizes thru 13" high
BLADES:	20-GA galvanized steel double skinned (equal to 14-GA); Parallel action
AXLES:	Plated solid steel stub
BEARINGS:	Oil impregnated bronze
LINKAGE:	Plated steel angle and crank plates with stainless steel pivots; In-jamb type
STOPS:	18-GA galvanized steel at head and sill
BLADE SEALS:	Silicone
JAMB SEALS:	Stainless steel
SLEEVE:	Minimum 20-GA galvanized steel by 18" long (sizes greater than 84" wide or 84" high require minimum 18-GA)
CAULKING:	Hardcast Irongrip 601 or UL-listed equivalent
FINISH:	Mill on galvanized steel
ACTUATOR:	Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Exact Size (No Undercut)
 Sleeve - Transitions
 Actuators - 120V, 24V, 230V or Pneumatic
 Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
 Dual Position Indication (IDPI) Switches
 Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
 Sensotherm Re-Openable Heat Response Device (PSOT) for Pneumatic Actuator
 Model SM-501 Flow-Rated Smoke Detector
 Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
 Momentary Test Switch
 Remote Test Box
 Transformers
 Tab-Lock Retaining Angles
 Stainless Steel Bearings
 Stainless Steel Axle
 Security Bars
 Copper Tubing (for Pneumatic Actuators)
 Sleeves Of Various Depth And Gauge Thickness (restriction apply)
 No Sleeve (restrictions apply)
 Round or Oval Transitions.
 Short-Width (<8") and/or Short-Height (<6") Transitions

NOTES

1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve will increase the size of the assembly.
2. Damper >= 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
3. Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
4. Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
5. Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

Damper Sizes


Orientation	Hor & Vert	** 2000 fpm, 4 in wg				4000 fpm, 6 in wg	
		Horizontal		Vertical		Horizontal & Vertical	
Panel	** Min Panel	Max Panel 250°/350°	Max Assy 250°/350°	Max Panel 250°/350°	Max Assy 250°/350°	Max Panel 250°	Max Assy 250°
Rectangular	4"W x 4"H (8"W x 6"H frame)	32"W x 48"H	96"W x 96"H	32"W x 48"H	128"W x 96"H	24"W x 24"H	96"W x 24"H
Round	4" dia. (8"W x 6"H frame)	30" Dia.	81" Dia.	30" Dia.	81" Dia.	22" Dia.	N/A
Oval	4"W x 4"H (8"W x 6"H frame)	30"W x 46"H	45 sq. ft. 94"W x 94"H	30"W x 46"H	45 sq. ft. 106"W x 94"H	22"W x 22"H	45 sq. ft. 106"W x 94"H

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.

** See Addendum for additional ratings

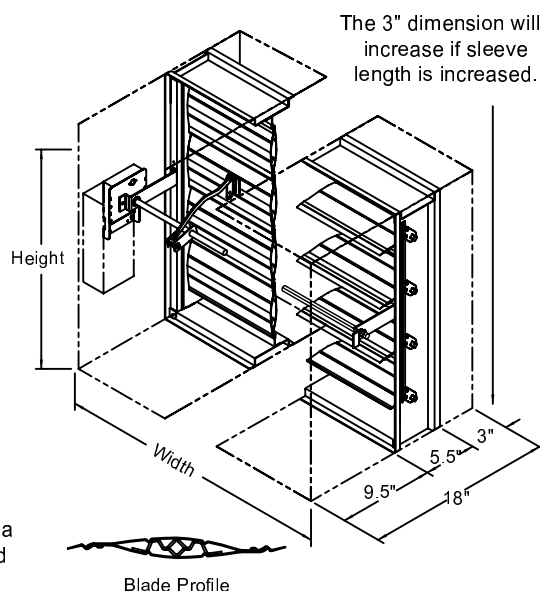
UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
 FIRE RESISTANCE RATING 1½ HR
 LEAKAGE RESISTANCE CLASS II

abi air balance **FILE #R4708**



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #111-99-M
- California State Fire Marshal Listing #3225-1328:118
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



Leakage Class II • 1½ Hour • Airfoil Blade • 250°F or 350°F • Galvanized Steel Airfoil Blade Fire/Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg (6 in. wg for selected size/actuator combinations)

Maximum Velocity: 2000 fpm (4000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class II

10 cfm per sq. ft. maximum @ 1 in. wg

20 cfm per sq. ft. maximum @ 4 in. wg

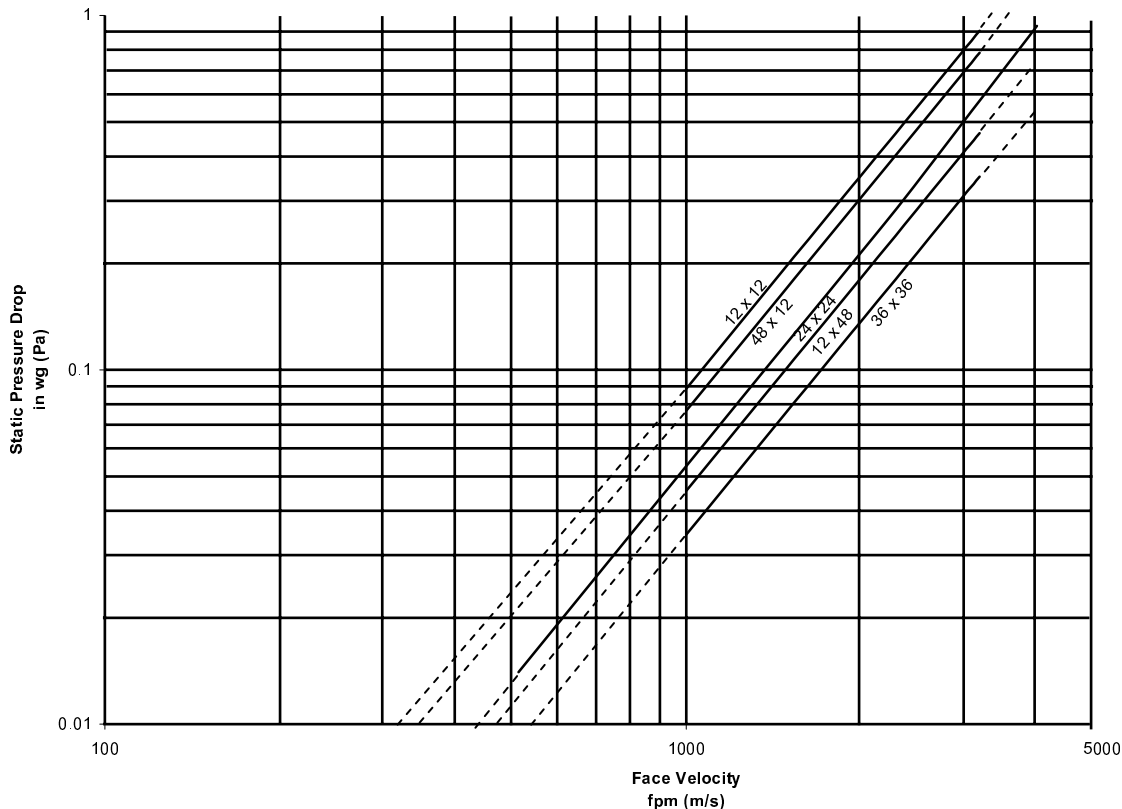
24.5 cfm per sq. ft. maximum @ 6 in. wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The Pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.

FA Pressure Drop**AMCA FIGURE 5.3**

Air Balance certifies that the model FA2 damper shown here is licensed to bear the AMA Seal. The ratings shown are based on tests and procedures performed in accordance with AMA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to the Air Performance Ratings only.

Leakage Class II • 1½ Hour • Airfoil Blade • 250°F or 350°F • Galvanized Steel Airfoil Blade Fire/Smoke Damper

ADDENDUM SD-FA2-13-08
Extended Pressure & Velocity Ratings**FA2 Extended Pressure & Velocity Ratings**

Damper Style	Temp Rating (°F)	Velocity & Pressure	Horizontal & Vertical Min Panel	Horizontal (floor mount)		Vertical (wall mount)	
				Max Panel	Max Assy	Max Panel	Max Assy
No Transition	250° - or - 350°	2000 fpm, 4" w.g.	8" x 6" frame	32" x 48" frame	96" x 96" frame	32" x 48" frame	128" x 96" frame
		3000 fpm, 4" w.g.		24" x 36" frame - or - 32" x 24" frame	96" x 72" frame	24" x 36" frame - or - 32" x 24" frame	96" x 72" frame
		4000 fpm, 4" w.g.		24" x 36" frame - or - 32" x 24" frame	96" x 36" frame	24" x 36" frame - or - 32" x 24" frame	96" x 36" frame
	250°	4000 fpm, 6" w.g.		24" x 24" frame	96" x 24" frame	24" x 24" frame	96" x 24" frame
	350°	4000 fpm, 6" w.g. (external act only for 350°)		16" x 24" frame	n/a	16" x 24" frame	n/a
C-Round - or - C-Square	250° - or - 350°	2000 fpm, 4" w.g.	4" dia. duct - or - 4" x 4" duct (8" x 6" frame)	30" dia. duct - or - 30" x 30" duct	81" dia. duct - or - 81" x 81" duct	30" dia. duct - or - 30" x 30" duct	81" dia. duct - or - 81" x 81" duct
		3000 fpm, 4" w.g.		22" dia. duct - or - 22" x 22" duct	70" dia. duct - or - 70" x 70" duct	22" dia. duct - or - 22" x 22" duct	70" dia. duct - or - 70" x 70" duct
		4000 fpm, 4" w.g.		22" dia. duct - or - 22" x 22" duct	34" dia. duct - or - 34" x 34" duct	22" dia. duct - or - 22" x 22" duct	34" dia. duct - or - 34" x 34" duct
	250°	4000 fpm, 6" w.g.		22" dia. duct - or - 22" x 22" duct			
	350°	4000 fpm, 6" w.g. (external act only for 350°)		14" dia. duct - or - 14" x 14" duct	n/a	14" dia. duct - or - 14" x 14" duct	n/a
C-Oval - or - C-Rectangle	250° - or - 350°	2000 fpm, 4" w.g.	4" x 4" duct (8" x 6" frame)	30" x 46" duct	70" x 94" duct - or - 94" x 70" duct	30" x 46" duct	70" x 94" duct - or - 94" x 70" duct
		3000 fpm, 4" w.g.		22" x 34" duct - or - 30" x 22" duct	94" x 70" duct	22" x 34" duct - or - 30" x 22" duct	94" x 70" duct
		4000 fpm, 4" w.g.		22" x 34" duct - or - 30" x 22" duct	94" x 34" duct	22" x 34" duct - or - 30" x 22" duct	94" x 34" duct
	250°	4000 fpm, 6" w.g. (external act only for 350°)		22" x 22" duct	94" x 22" duct	22" x 22" duct	94" x 22" duct
	350°	4000 fpm, 6" w.g. (external act only for 350°)		14" x 22" duct	n/a	14" x 22" duct	n/a

all dimensions are shown as width x height
for **NO TRANSITION**, order size = frame size = duct size
unless otherwise noted, duct size = order size

WITH TRANSITIONS, damper **frame** size = order width + 2" x order height + 2"

Leakage Class II • 1½ Hour • Airfoil Blade • 250°F • Fire/Smoke Damper
For Volume Control Applications

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x ⅞" x 16-GA galvanized steel hat channel; A flat head and sill are used for sizes thru 13" high
- BLADES:** 20-GA galvanized steel double skinned (equal to 14-GA); Parallel action
- AXLES:** Plated solid steel stub
- BEARINGS:** Oil impregnated bronze
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots; In-jamb type
- STOPS:** 18-GA galvanized steel at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA galvanized steel by 18" long
- CAULKING:** Hardcast Irongrip 601 or UL- listed equivalent
- FINISH:** Mill on galvanized steel
- ACTUATOR:** 24VAC/DC electric with heat response device (EHRD) Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Exact Size (no undercut)
Sleeve - Transitions
Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
Dual Position Indication (IDPI) Switches
Sensotherm Re-Openable Heat Response Device (ESOT)
Model SM-501 Flow-Rated Smoke Detector
Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
Remote Test Box
Momentary Test Switch
Transformers
Tab-Lock Retaining Angles
Stainless Steel Bearings
Stainless Steel Axle
Security Bars
Short-Width (<8") and/or Short-Height (<6") Transitions

NOTES

1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve will increase the size of the assembly.
2. Damper ≥ 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of damper opposite actuator.
3. Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
4. Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
5. Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.
6. Actuator control signal is 2 - 10 VDC or with addition of 500 ohm resistor (by others) is 4 - 20 mA.

DAMPER SIZES

Damper Style	Temp Rating (°F)	Velocity & Pressure	Horizontal & Vertical Min Panel	Horizontal & Vertical Max Panel	Horizontal & Vertical Max Assy
No Transition	250°	2000 fpm, 4" w.g.	8" x 6" frame	24" x 24" frame	96" x 48" frame
C-Round - or - C-Square			4" dia. duct - or - 4" x 4" duct (8" x 6" frame)	22" dia. duct - or - 22" x 22" duct	46" dia. duct - or - 46" x 46" duct
C-Oval - or - C-Rectangle			4" x 4" duct (8" x 6" frame)	22" x 22" duct	94" x 46" duct

*all dimensions are shown as width x height
for **NO TRANSITION**, order size = frame size = duct size
unless otherwise noted, duct size = order size*

***WITH TRANSITIONS**, damper **frame** size = order width + 2" x order height + 2"*

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.

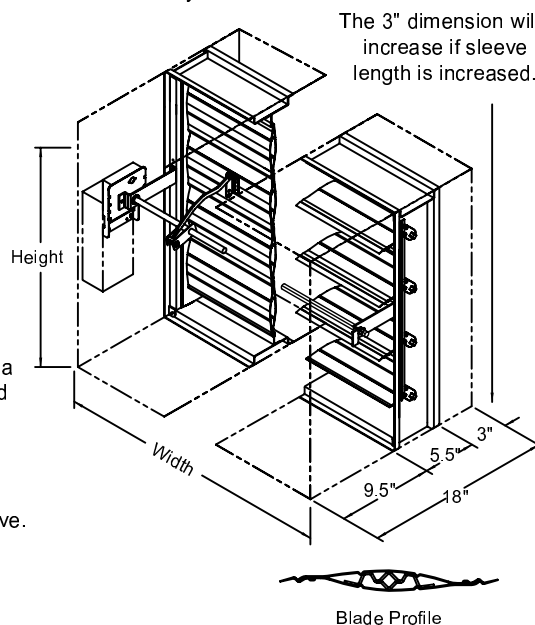


UNDERWRITERS LABORATORIES INC.®
CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
FIRE RESISTANCE RATING 1½ HR
LEAKAGE RESISTANCE CLASS II

abi air balance **FILE #R4708**

This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #111-99-M
- California State Fire Marshal Listing #3225-1328:118
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



MODEL FA2M (Modulating)

SD-FA2M-13.07

Leakage Class II • 1½ Hour • Airfoil Blade • 250°F • Fire/Smoke Damper
For Volume Control Applications

Operations Ratings:

Maximum Differential Pressure: 4 in. wg
Maximum Velocity: 2000 fpm

Leakage Ratings:

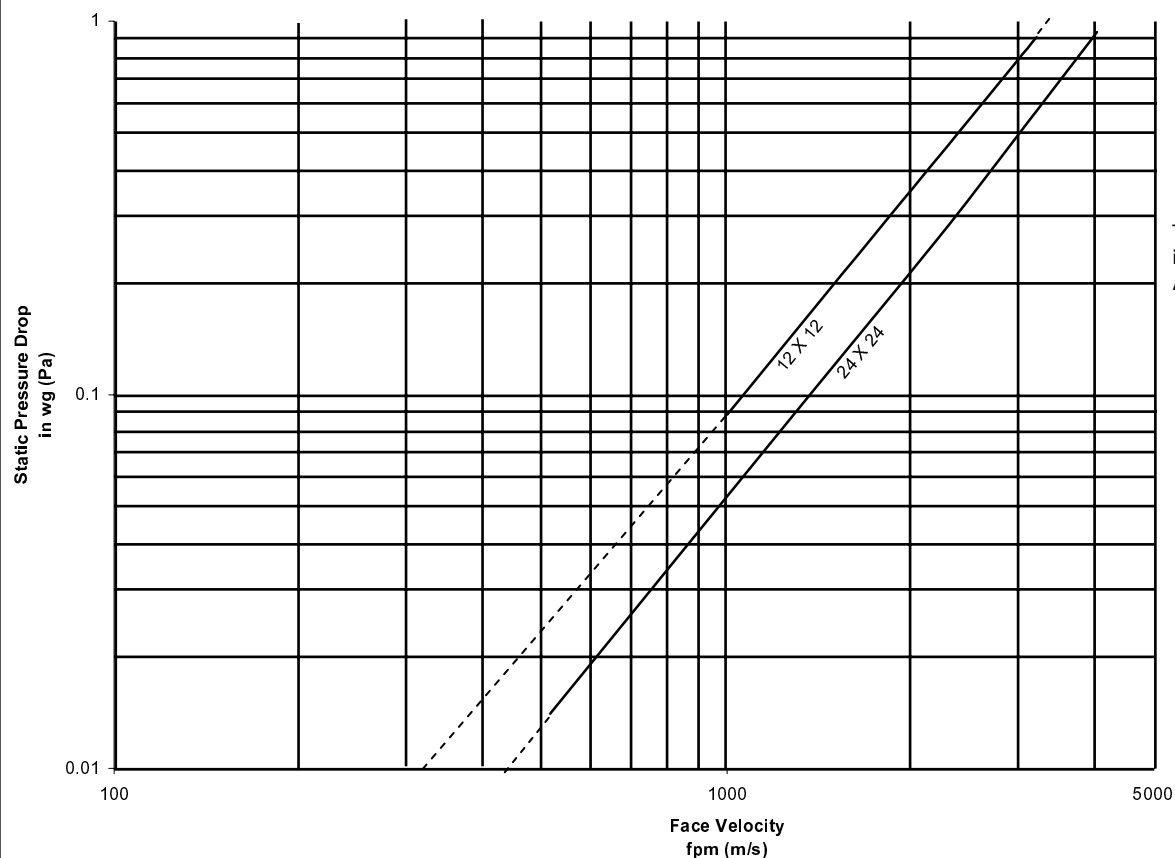
UL Class II
10 cfm per sq. ft. maximum @ 1 in. wg
20 cfm per sq. ft. maximum @ 4 in. wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The Pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.

FA2M Pressure Drop

This product was tested
in accordance with
AMCA Standard 500D

AMCA FIGURE 5.3

Leakage Class I • Airfoil Blade • 3 Hour • 250°F or 350°F • Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x ¾" x 16-GA galvanized steel hat channel; A flat head and sill are used for sizes thru 13" high
- BLADES:** 20-GA galvanized steel double skinned (equal to 14-GA); Parallel action
- AXLES:** Plated solid steel stub
- BEARINGS:** Oil impregnated bronze
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots; In-jamb type
- STOPS:** 18-GA galvanized steel at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA galvanized steel by 18" long
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- FINISH:** Mill on galvanized steel
- ACTUATOR:** Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Exact Size (no undercut)
 Actuators - 120V, 24V, 230V or Pneumatic
 Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
 Integral Dual Position Indication (IDPI) Switches
 Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
 Sensotherm Re-Openable Heat Response Device (PSOT) for Pneumatic Actuator
 Model SM-501 Flow-Rated Smoke Detector
 Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
 Momentary Test Switch
 Remote Test Box
 Transformers
 Tab-Lock Retaining Angles
 Stainless Steel Bearings
 Stainless Steel Axles
 Security Bars
 Copper Tubing (for Pneumatic Actuators)
 Sleeves of Various Depths and Gauge Thicknesses (restriction apply)
 No Sleeves (restriction apply)
 Round or Oval Transitions
 Short-Width (<8") and/or Short-Height (<6") Transitions

NOTES

1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve will increase the size of the assembly.
2. Damper >= 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
3. Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
4. Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
5. Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

DAMPER SIZES


** 2000 fpm, 4 in. w.g.			
Orientation	Horizontal & Vertical		
Panels	Min. Panel	Max. Panel	Max. Assy
Rectangular	4"W x 4"H (8"W x 6"H frame)	30"W x 48"H	60"W x 48"H
Round	4" dia. (8"W x 6"H frame)	28" dia.	46" dia.
Oval	4"W x 4"H (8"W x 6"H frame)	28"W x 46"H	58"W x 46"H

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.

** See addendum on page 3 for additional ratings.

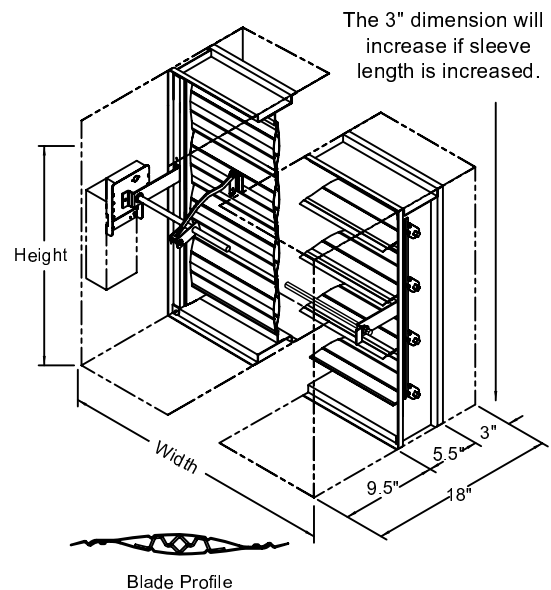
UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
 FIRE RESISTANCE RATING 3 HR
 LEAKAGE RESISTANCE CLASS I

abi air balance **FILE #R4708**



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #111-99-M
- California State Fire Marshal Listing #3225-1328:118
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of 3 hours and longer.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



Leakage Class I • Airfoil Blade • 3 Hour • 250°F or 350°F • Fire/Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg (6 in. wg for selected size/actuators combinations)

Maximum Velocity: 2000 fpm (4000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class I

4 cfm per sq. ft. maximum @ 1 in. wg

8 cfm per sq. ft. maximum @ 4 in. wg

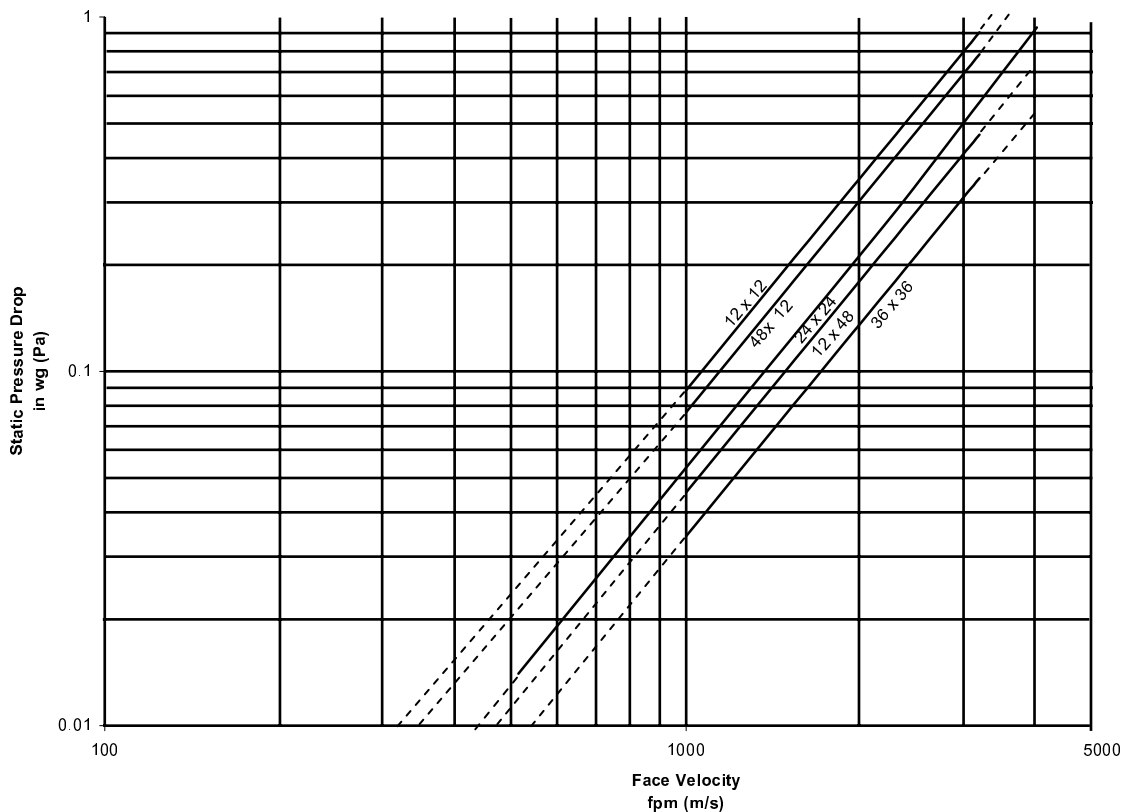
9.8 cfm per sq. ft. maximum @ 6 in. wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The Pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.

TA Pressure Drop

This product was tested
in accordance with AMCA
Standard 500D.

AMCA FIGURE 5.3

Leakage Class I • Airfoil Blade • 3 Hour • 250°F or 350°F • Fire/Smoke Damper

ADDENDUM SD-TA1-13-08
Extended Pressure & Velocity Ratings**TA1 Extended Pressure & Velocity Ratings**

Damper Style	Temp Rating (°F)	Velocity & Pressure	Horizontal & Vertical Min Panel	Horizontal (floor mount)		Vertical (wall mount)	
				Max Panel	Max Assy	Max Panel	Max Assy
No Transition	250° - or - 350°	2000 fpm, 4" w.g.	8" x 6" frame	30" x 48" frame	60" x 48" frame	30" x 48" frame	60" x 48" frame
		3000 fpm, 4" w.g.		24" x 36" frame - or - 30" x 24" frame	60" x 48" frame	24" x 36" frame - or - 30" x 24" frame	60" x 48" frame
		4000 fpm, 4" w.g.		24" x 36" frame - or - 30" x 24" frame	60" x 36" frame	24" x 36" frame - or - 30" x 24" frame	60" x 36" frame
		4000 fpm, 6" w.g. (external act only for 350°)		16" x 24" frame	n/a	16" x 24" frame	n/a
C-Round - or - C-Square	250° - or - 350°	2000 fpm, 4" w.g.	4" dia. duct - or - 4" x 4" duct (8" x 6" frame)	28" dia. duct - or - 28" x 28" duct	46" dia. duct - or - 46" x 46" duct	28" dia. duct - or - 28" x 28" duct	46" dia. duct - or - 46" x 46" duct
		3000 fpm, 4" w.g.		22" dia. duct - or - 22" x 22" duct	46" dia. duct - or - 46" x 46" duct	22" dia. duct - or - 22" x 22" duct	46" dia. duct - or - 46" x 46" duct
		4000 fpm, 4" w.g.		22" dia. duct - or - 22" x 22" duct	34" dia. duct - or - 34" x 34" duct	22" dia. duct - or - 22" x 22" duct	34" dia. duct - or - 34" x 34" duct
		4000 fpm, 6" w.g. (external act only for 350°)		14" dia. duct - or - 14" x 14" duct	n/a	14" dia. duct - or - 14" x 14" duct	n/a
C-Oval - or - C-Rectangle	250° - or - 350°	2000 fpm, 4" w.g.	4" x 4" duct (8" x 6" frame)	28" x 46" duct	58" X 46" duct	28" x 46" duct	58" X 46" duct
		3000 fpm, 4" w.g.		22" x 34" duct - or - 28" x 22" duct	58" x 46" duct	22" x 34" duct - or - 28" x 22" duct	58" x 46" duct
		4000 fpm, 4" w.g.		22" x 34" duct - or - 28" x 22" duct	58" x 34" duct	22" x 34" duct - or - 28" x 22" duct	58" x 34" duct
		4000 fpm, 6" w.g. (external act only for 350°)		14" x 22" duct	n/a	14" x 22" duct	n/a

all dimensions are shown as width x height
for **NO TRANSITION**, order size = frame size = duct size

unless otherwise noted, duct size = order size

WITH TRANSITIONS, damper **frame** size = order width + 2" x order height + 2"

Leakage Class II • Airfoil Blade • 3 Hour • 250°F or 350°F • Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7⁄8" x 16-GA galvanized steel hat channel; A flat head and sill are used for sizes thru 13" high
- BLADES:** 20-GA galvanized steel double skinned (equal to 14-GA); Parallel action
- AXLES:** Plated solid steel stub
- BEARINGS:** Oil impregnated bronze
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots; In-jamb type
- STOPS:** 18-GA galvanized steel at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA galvanized steel by 18" long
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- FINISH:** Mill on galvanized steel
- ACTUATOR:** Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Exact Size (no undercut)
 Actuators - 120V, 24V, 230V or Pneumatic
 Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
 Integral Dual Position Indication (IDPI) Switches
 Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
 Sensotherm Re-Openable Heat Response Device (PSOT) for Pneumatic Actuator
 Model SM-501 Flow-Rated Smoke Detector
 Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
 Momentary Test Switch
 Remote Test Box
 Transformers
 Tab-Lock Retaining Angles
 Stainless Steel Bearings
 Stainless Steel Axles
 Security Bars
 Copper Tubing (for Pneumatic Actuators)
 Sleeves of Various Depths and Gauge Thicknesses (restriction apply)
 No Sleeves (restriction apply)
 Round or Oval Transitions
 Short-Width (<8") and/or Short-Height (<6") Transitions

NOTES

- Damper frames are provided approximately ¼" undersized. The addition of a sleeve will increase the size of the assembly.
- Damper ≥ 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
- Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
- Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
- Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

DAMPER SIZES		2000 fpm, 4 in.wg				** 4000 fpm, 6 in.wg	
Orientation	Hor & Vert	Horizontal		Vertical		Horizontal or Vertical	
Panel	Min Panel 250°/350°	Max Panel 250°/350°	Max Assy 250°/350°	Max Panel 250°/350°	Max Assy 250°/350°	Max Panel 250° only	Max Assy 250° only
Rectangular	4"W x 4"H (8"W x 6"H frame)	30"W x 48"H	60"W x 48"H	30"W x 48"H	60"W x 48"H	24"W x 24"H	60"W x 24"H
Round	4" dia. (8"W x 6"H frame)	28" dia.	46" dia.	28" dia.	46" dia.	22" dia.	22" dia.
Oval	4"W x 4"H (8"W x 6"H frame)	28"W x 46"H	58"W x 46"H	28"W x 46"H	58"W x 46"H	22"W x 22"H	22"W x 22"H



*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.

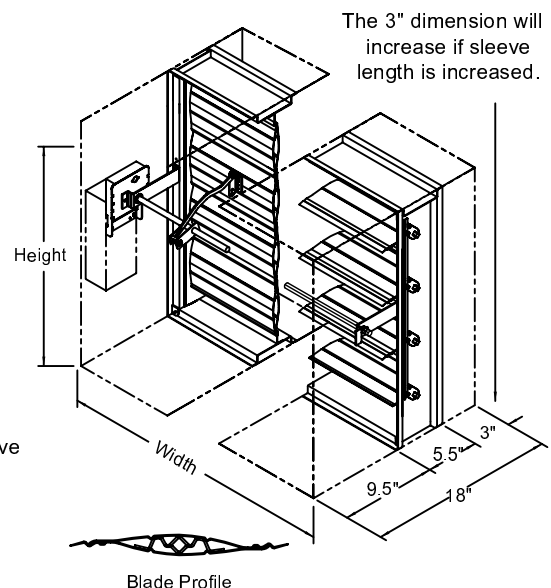
** See addendum for additional ratings.

UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
 FIRE RESISTANCE RATING 3 HR
 LEAKAGE RESISTANCE CLASS II

abi air balance **FILE #R4708**

This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #111-99-M
- California State Fire Marshal Listing #3225-1328:118
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of 3 hours and longer.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



Leakage Class II • Airfoil Blade • 3 Hour • 250°F or 350°F • Fire/Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg (6 in.wg for selected size/actuator combinations)

Maximum Velocity: 2000 fpm (4000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class II

10 cfm per sq. ft. maximum @ 1 in. wg

20 cfm per sq. ft. maximum @ 4 in. wg

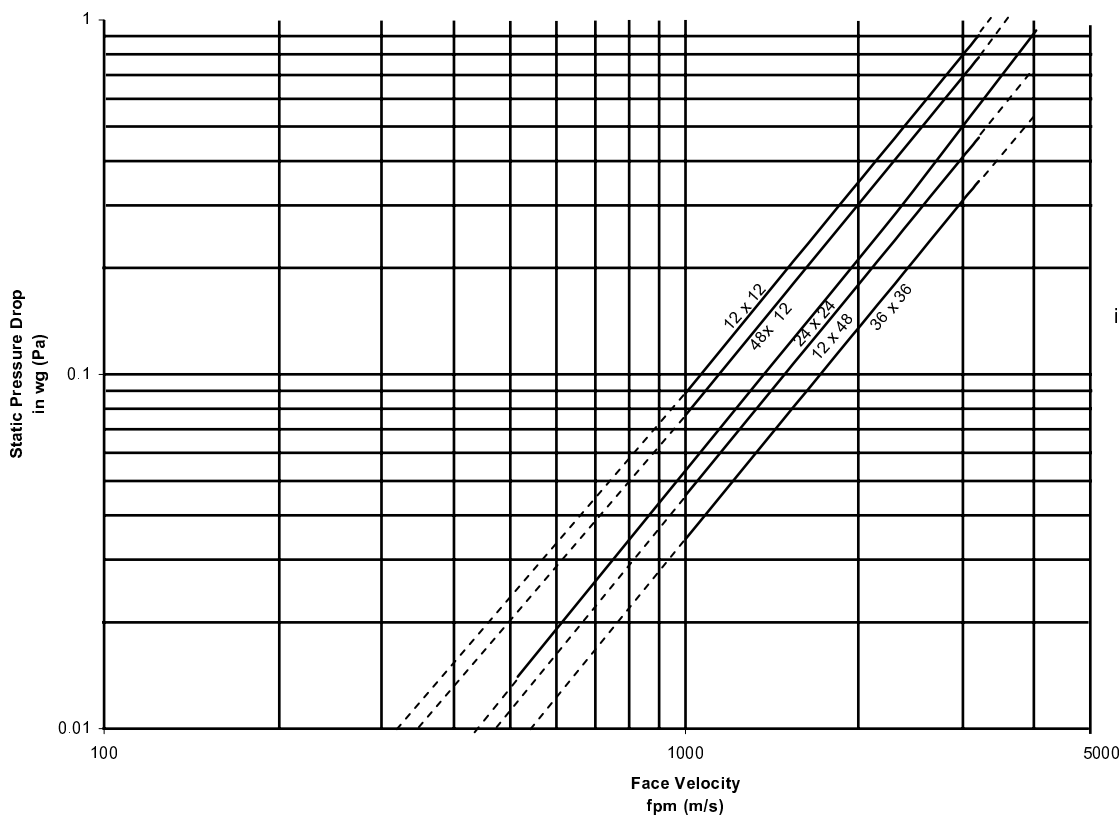
24.5 cfm per sq.ft. maximum @ 6 in. wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The Pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.

TA Pressure Drop

This product was tested
in accordance with AMCA
Standard 500D.

AMCA FIGURE 5.3

ADDENDUM SD-TA2-13-08

Extended Pressure & Velocity Ratings

TA2 Extended Pressure & Velocity Ratings

Damper Style	Temp Rating (°F)	Velocity & Pressure	Horizontal & Vertical Min Panel	Horizontal (floor mount)		Vertical (wall mount)	
				Max Panel	Max Assy	Max Panel	Max Assy
No Transition	250° - or - 350°	2000 fpm, 4" w.g.	8" x 6" frame	30" x 48" frame	60" x 48" frame	30" x 48" frame	60" x 48" frame
		3000 fpm, 4" w.g.		24" x 36" frame - or - 30" x 24" frame	60" x 48" frame	24" x 36" frame - or - 30" x 24" frame	60" x 48" frame
		4000 fpm, 4" w.g.		24" x 36" frame - or - 30" x 24" frame	60" x 36" frame	24" x 36" frame - or - 30" x 24" frame	60" x 36" frame
	250°	4000 fpm, 6" w.g.		24" x 24" frame	60" x 24" frame	24" x 24" frame	60" x 24" frame
	350°	4000 fpm, 6" w.g. (external act only for 350°)		16" x 24" frame	n/a	16" x 24" frame	n/a
C-Round - or - C-Square	250° - or - 350°	2000 fpm, 4" w.g.	4" dia. duct - or - 4" x 4" duct (8" x 6" frame)	28" dia. duct - or - 28" x 28" duct	46" dia. duct - or - 46" x 46" duct	28" dia. duct - or - 28" x 28" duct	46" dia. duct - or - 46" x 46" duct
		3000 fpm, 4" w.g.		22" dia. duct - or - 22" x 22" duct	46" dia. duct - or - 46" x 46" duct	22" dia. duct - or - 22" x 22" duct	46" dia. duct - or - 46" x 46" duct
		4000 fpm, 4" w.g.		22" dia. duct - or - 22" x 22" duct	34" dia. duct - or - 34" x 34" duct	22" dia. duct - or - 22" x 22" duct	34" dia. duct - or - 34" x 34" duct
	250°	4000 fpm, 6" w.g.		22" dia. duct - or - 22" x 22" duct			
	350°	4000 fpm, 6" w.g. (external act only for 350°)		14" dia. duct - or - 14" x 14" duct	n/a	14" dia. duct - or - 14" x 14" duct	n/a
C-Oval - or - C-Rectangle	250° - or - 350°	2000 fpm, 4" w.g.	4" x 4" duct (8" x 6" frame)	28" x 46" duct	58" x 46" duct	28" x 46" duct	58" x 46" duct
		3000 fpm, 4" w.g.		22" x 34" duct - or - 28" x 22" duct	58" x 46" duct	22" x 34" duct - or - 28" x 22" duct	58" x 46" duct
		4000 fpm, 4" w.g.		22" x 34" duct - or - 28" x 22" duct	58" x 34" duct	22" x 34" duct - or - 28" x 22" duct	58" x 34" duct
	250°	4000 fpm, 6" w.g.		22" x 22" duct	58" x 22" duct	22" x 22" duct	58" x 22" duct
	350°	4000 fpm, 6" w.g. (external act only for 350°)		14" x 22" duct	n/a	14" x 22" duct	n/a

all dimensions are shown as width x height
for **NO TRANSITION**, order size = frame size = duct size
unless otherwise noted, duct size = order size

WITH TRANSITIONS, damper **frame** size = order width + 2" x order height + 2"

Leakage Class II • Airfoil Blade • 3 Hour • 250°F • Fire/Smoke Damper
For Volume Control Applications

STANDARD MATERIALS AND CONSTRUCTION

FRAME:	5½" x ⅞" x 16-GA galvanized steel hat channel; A flat head and sill are used for sizes thru 13" high
BLADES:	20-GA galvanized steel double skinned (equal to 14-GA); Parallel action
AXLES:	Plated solid steel stub
BEARINGS:	Oil impregnated bronze
LINKAGE:	Plated steel angle and crank plates with stainless steel pivots; In-jamb type
STOPS:	18-GA galvanized steel at head and sill
BLADE SEALS:	Silicone
JAMB SEALS:	Stainless steel
SLEEVE:	Minimum 20-GA galvanized steel by 18" long
CAULKING:	Hardcast Irongrip 601 or UL-listed equivalent
FINISH:	Mill on galvanized steel
ACTUATOR:	24 VAC/DC Electric with heat response device (EHRD) Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jack shaft side of damper

OPTIONS

Exact Size (no undercut)
Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
Dual Position Indication (IDPI) Switches
Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
Model SM-501 Flow-Rated Smoke Detector
Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
Remote Test Box
Momentary Test Switch
Transformers
Tab-Lock Retaining Angles
Stainless Steel Bearings
Stainless Steel Axles
Sleeves of Various Depths and Gauge Thicknesses (restrictions apply)
No Sleeve (restrictions apply)
Round or Oval Transitions
Security Bars
Short-Width (<8") and/or Short-Height (<6") Transitions

NOTES


1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve will increase the size of the assembly.
2. Damper >= 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on side of the damper opposite actuator.
3. Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
4. Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
5. Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.
6. Actuator control signal is 2 - 10 VDC or with additional of 500 ohm resistor (by other) is 4-20 mA.

DAMPER SIZES

Damper Style	Temp Rating (°F)	Velocity & Pressure	Horizontal & Vertical Min Panel	Horizontal & Vertical Max Panel	Horizontal & Vertical Max Assy
No Transition	250°	2000 fpm, 4" w.g.	8" x 6" frame	24" x 24" frame	60" x 48" frame
C-Round - or - C-Square			4" dia. duct - or - 4" x 4" duct (8" x 6" frame)	22" dia. duct - or - 22" x 22" duct	46" dia. duct - or - 46" x 46" duct
C-Oval - or - C-Rectangle			4" x 4" duct (8" x 6" frame)	22" x 22" duct	58" x 46" duct

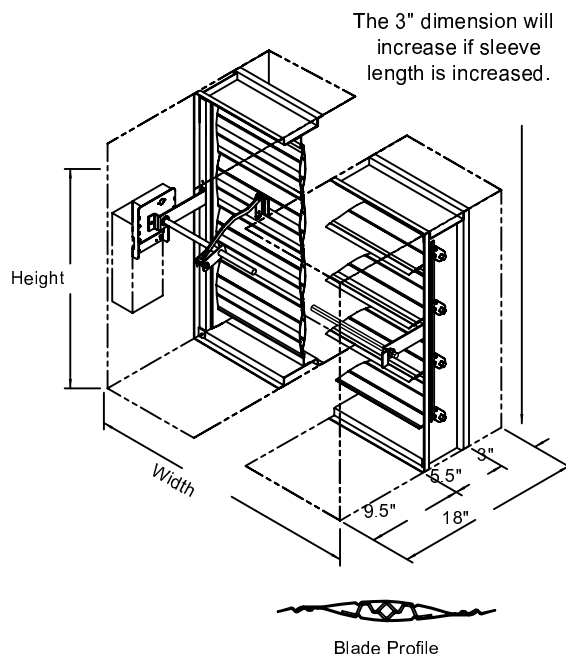
UNDERWRITERS LABORATORIES INC.®
CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
FIRE RESISTANCE RATING 3 HR
LEAKAGE RESISTANCE CLASS II

abi air balance **FILE #R4708**



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #111-99-M
- California State Fire Marshal Listing #3225-1328:118
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of 3 hours and longer.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F .
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



all dimensions are shown as width x height
for **NO TRANSITION**, order size = frame size = duct size
unless otherwise noted, duct size = order size

WITH TRANSITIONS, damper **frame** size = order width + 2" x order height + 2"

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.

MODEL TA2M (Modulating)

Leakage Class II • Airfoil Blade • 3 Hour • 250°F • Fire/Smoke Damper
For Volume Control Applications

Operations Ratings:

Maximum Differential Pressure: 4 in. wg
Maximum Velocity: 2000 fpm

Leakage Ratings:

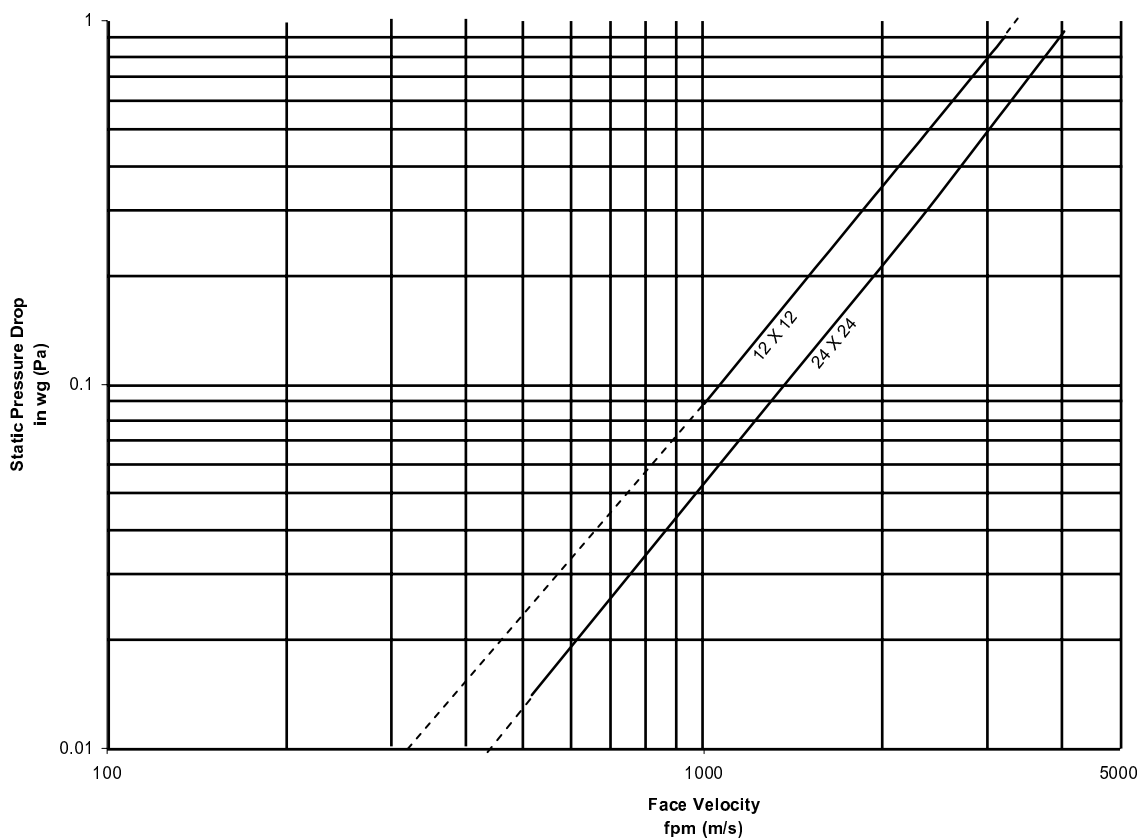
UL Class II
10 cfm per sq. ft. maximum @ 1 in. wg
20 cfm per sq. ft. maximum @ 4 in. wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The Pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.

TA2M Pressure Drop

This product was tested
in accordance to AMCA
Standard 50.3D.

AMCA FIGURE 5.3

Leakage Class I • 1½ Hour • Single Thickness Blade • 250°F or 350°F • Front Access Grille Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7⁄8" x 16-GA galvanized steel hat channel
BLADES: 16-GA galvanized steel, single thickness; Parallel action
AXLES: Square, plated solid steel stub
BEARINGS: Oil impregnated bronze
LINKAGE: Plated steel angle and crank plates with stainless steel pivots; In-jamb type
STOPS: 20-GA galvanized steel at head and sill
BLADE SEALS: Silicone
JAMB SEALS: Stainless steel
SLEEVE: 20-GA galvanized steel by 15" long (1½" grille clearance) or 17" long (3½" grill clearance) with 13⁄16" front flange
CAULKING: Hardcast Irongrip 601 or UL-listed equivalent
FINISH: Mill on galvanized steel
ACTUATOR: Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; Internally mounted and accessible from grille side

OPTIONS

Integral Dual Position Indication (IDPI) Switches
 Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
 Sensotherm Re-Openable Heat Response Device (ESOP) for Pneumatic Actuator
 Model SM-501 Flow-Rated Smoke Detector (10" Minimum Damper Height)
 Shipped Loose
 Model 2151 No-Flow Smoke Detector (14" Minimum Damper Height)
 Tab-Lock Retaining Angles
 Stainless Steel Bearings
 Copper Tubing (for Pneumatic Actuators)
 Sleeves of Various Gauge Thicknesses
 Round or Oval Transitions
 Short-Width (<16") and/or Short-Height (<8") Transitions

NOTES

1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve and insulation will increase the size of the assembly. See II-FAGM for sizing openings.
2. Damper with smoke detector must have a minimum sleeve of 16" (1½" setback) or 18" (3" setback).
3. Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

DAMPER SIZES

Orientation	2000 fpm, 4 in.wg		
	Hor & Vert	Horizontal	Vertical
Panel	Min Panel	Max Panel	Max Panel
Rectangular	10"W x 10"H (16"W x 10"H frame)	36"W x 42"H	36"W x 42"H
Round	8" dia. (16"W x 10"H frame)	34" dia.	34" dia.
Oval	8"W x 8"H (16"W x 10"H frame)	34"W x 40"H	34"W x 40"H

*Dampers smaller than minimum frame size require a transition.
 Reference SD-TRFS.

UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
 FIRE RESISTANCE RATING 1½ HR
 LEAKAGE RESISTANCE CLASS I

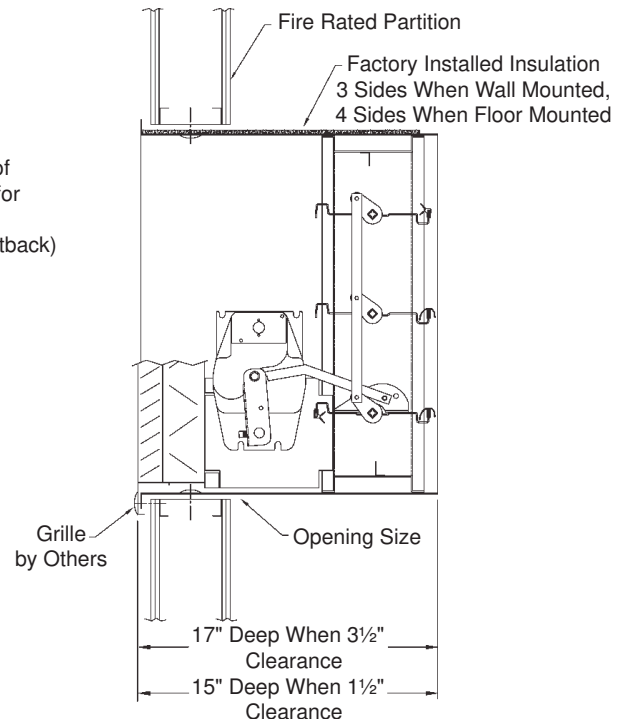
abi air balance

FILE #R4708



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #111-99-M
- California State Fire Marshal Listing #3225-1328:119
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



MODEL FS1G/FS1F

Leakage Class I • 1½ Hour • Single Thickness Blade • 250°F or 350°F • Front Access Grille Fire/Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg

Maximum Velocity: 2000 fpm

Leakage Ratings:

UL Class I

4 cfm per sq. ft. maximum @ 1 in. wg

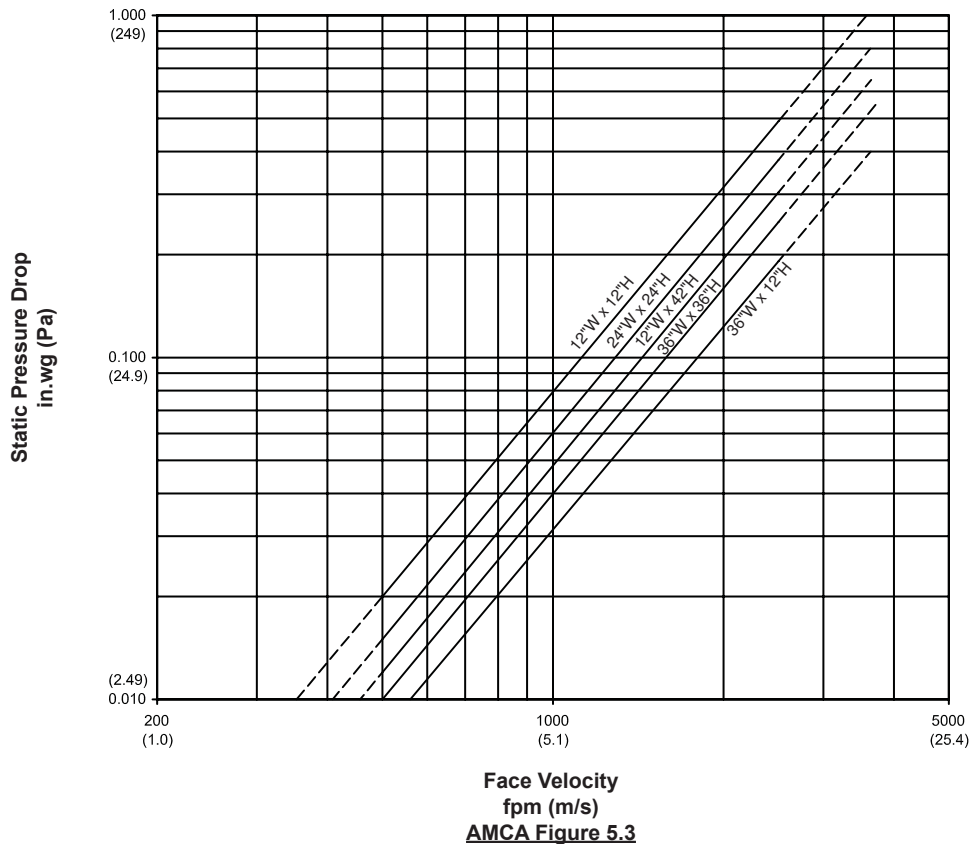
8 cfm per sq. ft. maximum @ 4 in. wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with
AMCA Standard 500D.

Leakage Class II • 1½ Hour • Single Thickness Blade • 250°F or 350°F • Front Access Grille Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7⁄8" x 16-GA galvanized steel hat channel
BLADES: 16-GA galvanized steel, single thickness; Parallel action
AXLES: Square, plated solid steel stub
BEARINGS: Oil impregnated bronze
LINKAGE: Plated steel angle and crank plates with stainless steel pivots; In-jamb type
STOPS: 20-GA galvanized steel at head and sill
BLADE SEALS: Silicone
JAMB SEALS: Stainless steel
SLEEVE: 20-GA galvanized steel by 15" long (1½" grille clearance) or 17" long (3½" grill clearance) with 13⁄16" front flange
CAULKING: Hardcast Irongrip 601 or UL-listed equivalent
FINISH: Mill on galvanized steel
ACTUATOR: Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; Internally mounted and accessible from grille side

OPTIONS

Integral Dual Position Indication (IDPI) Switches
 Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
 Sensotherm Re-Openable Heat Response Device (ESOP) for Pneumatic Actuator
 Model SM-501 Flow-Rated Smoke Detector (10" Minimum Damper Height)
 Shipped Loose
 Model 2151 No-Flow Smoke Detector (14" Minimum Damper Height)
 Tab-Lock Retaining Angles
 Stainless Steel Bearings
 Copper Tubing (for Pneumatic Actuators)
 Sleeves of Various Gauge Thicknesses
 Round or Oval Transitions
 Short-Width (<10") and/or Short-Height (<10") Transitions

NOTES

1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve and insulation will increase the size of the assembly. See II-FAGM for sizing openings.
2. Damper with smoke detector must have a minimum sleeve of 16" (1½ setback) or 18" (3" setback).
3. Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

DAMPER SIZES

Orientation	2000 fpm, 4 in.wg		
	Hor & Vert	Horizontal	Vertical
Panel	Min Panel	Max Panel	Max Panel
Rectangular	10"W x 10"H (10"W x 10"H frame)	36"W x 42"H	36"W x 42"H
Round	8" dia. (10"W x 10"H frame)	34" dia.	34" dia.
Oval	8"W x 8"H (10"W x 10"H frame)	34"W x 40"H	34"W x 40"H

*Dampers smaller than minimum frame size require a transition.
 Reference SD-TRFS.

UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER

 FIRE RESISTANCE RATING 1½ HR
 LEAKAGE RESISTANCE CLASS II

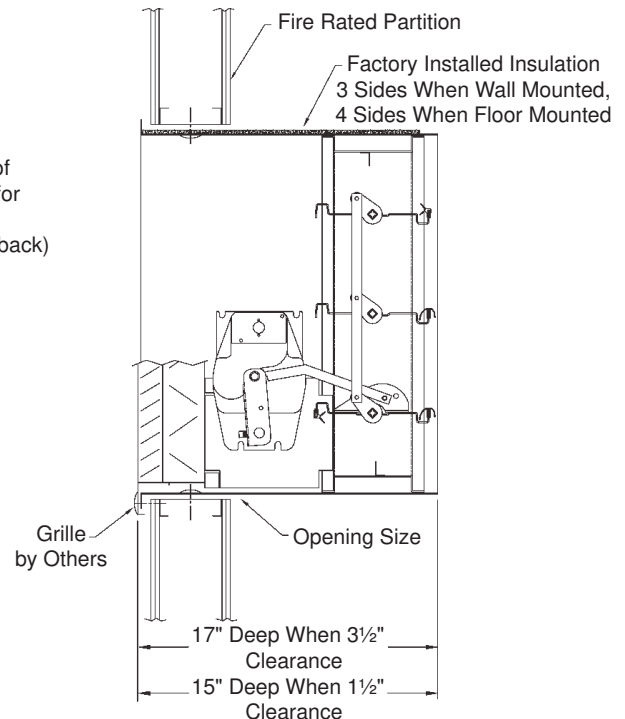
abi air balance

FILE #R4708



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #111-99-M
- California State Fire Marshal Listing #3225-1328:119
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



MODEL FS2G/FS2F

Leakage Class II • 1½ Hour • Single Thickness Blade • 250°F or 350°F • Front Access Grille Fire/Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg
Maximum Velocity: 2000 fpm

Leakage Ratings:

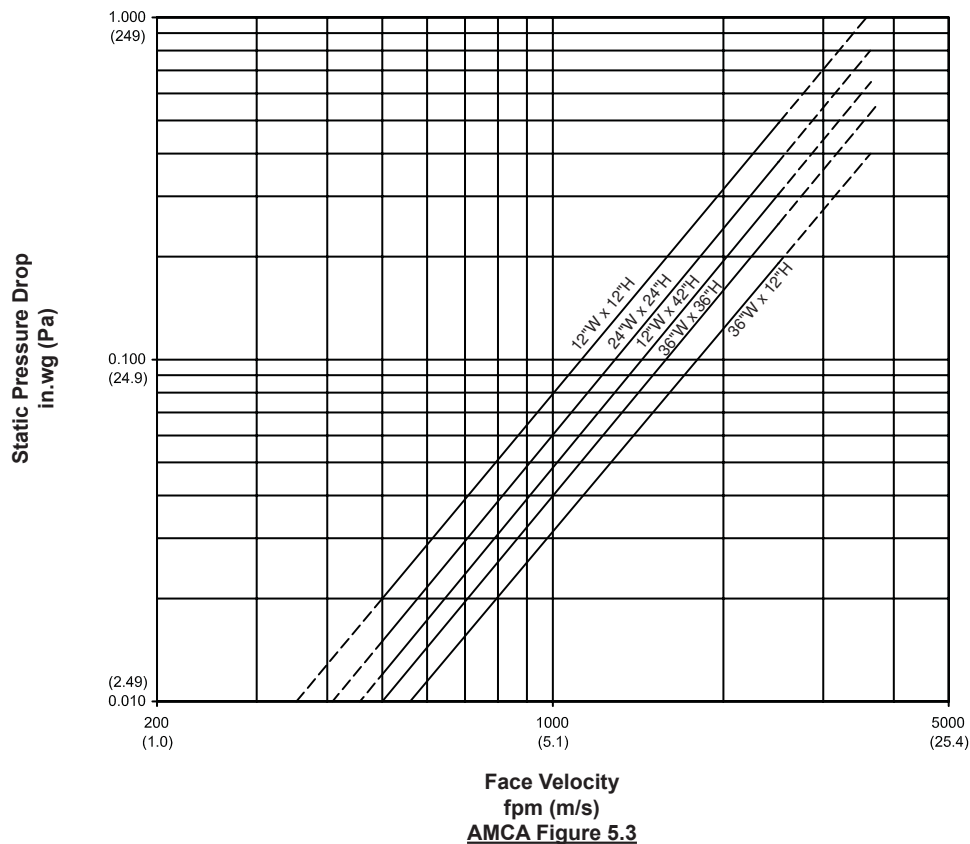
UL Class II
10 cfm per sq. ft. maximum @ 1 in. wg
20 cfm per sq. ft. maximum @ 4 in. wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with
AMCA Standard 500D.

Leakage Class I • 1½ Hour • Airfoil Blade • 250°F or 350°F • Front Access Grille Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7⁄8" x 16-GA galvanized steel hat channel
BLADES: 20-GA double-skinned, equal to 14-GA; Parallel action
AXLES: Square, plated solid steel stub
BEARINGS: Oil impregnated bronze
LINKAGE: Plated steel angle and crank plates with stainless steel pivots; In-jamb type
STOPS: 20-GA galvanized steel at head and sill
BLADE SEALS: Silicone
JAMB SEALS: Stainless steel
SLEEVE: 20-GA galvanized steel by 15" long (1½" grille clearance) or 17" long (3½" grill clearance) with 13⁄16" front flange
CAULKING: Hardcast Irongrip 601 or UL-listed equivalent
FINISH: Mill on galvanized steel
ACTUATOR: Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; Internally mounted and accessible from grille side

OPTIONS

Integral Dual Position Indication (IDPI) Switches
 Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
 Sensotherm Re-Openable Heat Response Device (ESOP) for Pneumatic Actuator
 Model SM-501 Flow-Rated Smoke Detector (10" Minimum Damper Height)
 Shipped Loose
 Model 2151 No-Flow Smoke Detector (14" Minimum Damper Height)
 Tab-Lock Retaining Angles
 Stainless Steel Bearings
 Copper Tubing (for Pneumatic Actuators)
 Sleeves of Various Gauge Thicknesses
 Round or Oval Transitions
 Short-Width (<12") and/or Short-Height (<10") Transitions

NOTES

1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve and insulation will increase the size of the assembly. See II-FAGM for sizing openings.
2. Damper with smoke detector must have a minimum sleeve of 16" (1½" setback) or 18" (3" setback).
3. Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

DAMPER SIZES

2000 fpm, 4 in.wg			
Orientation	Hor & Vert	Horizontal	Vertical
Panel	Min Panel	Max Panel	Max Panel
Rectangular	12"W x 10"H (12"W x 10"H frame)	32"W x 42"H	32"W x 42"H
Round	8" dia. (12"W x 10"H frame)	30" dia.	30" dia.
Oval	10"W x 8"H (12"W x 10"H frame)	30"W x 40"H	30"W x 40"H

*Dampers smaller than minimum frame size require a transition.
 Reference SD-TRFS.

UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER

 FIRE RESISTANCE RATING 1½ HR
 LEAKAGE RESISTANCE CLASS I

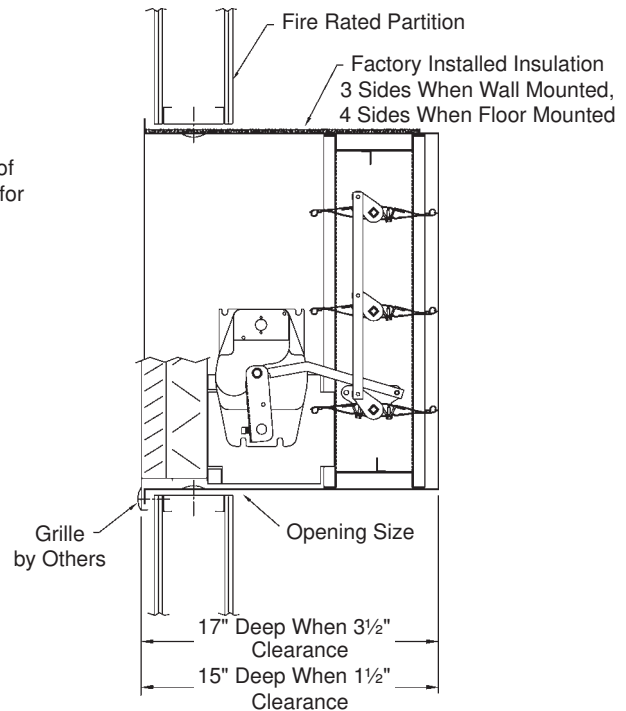
abi air balance

FILE #R4708



This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #111-99-M
- California State Fire Marshal Listing #3225-1328:118
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



MODEL FA1G/FA1F

Leakage Class I • 1½ Hour • Airfoil Blade • 250°F or 350°F • Front Access Grille Fire/Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg
Maximum Velocity: 2000 fpm

Leakage Ratings:

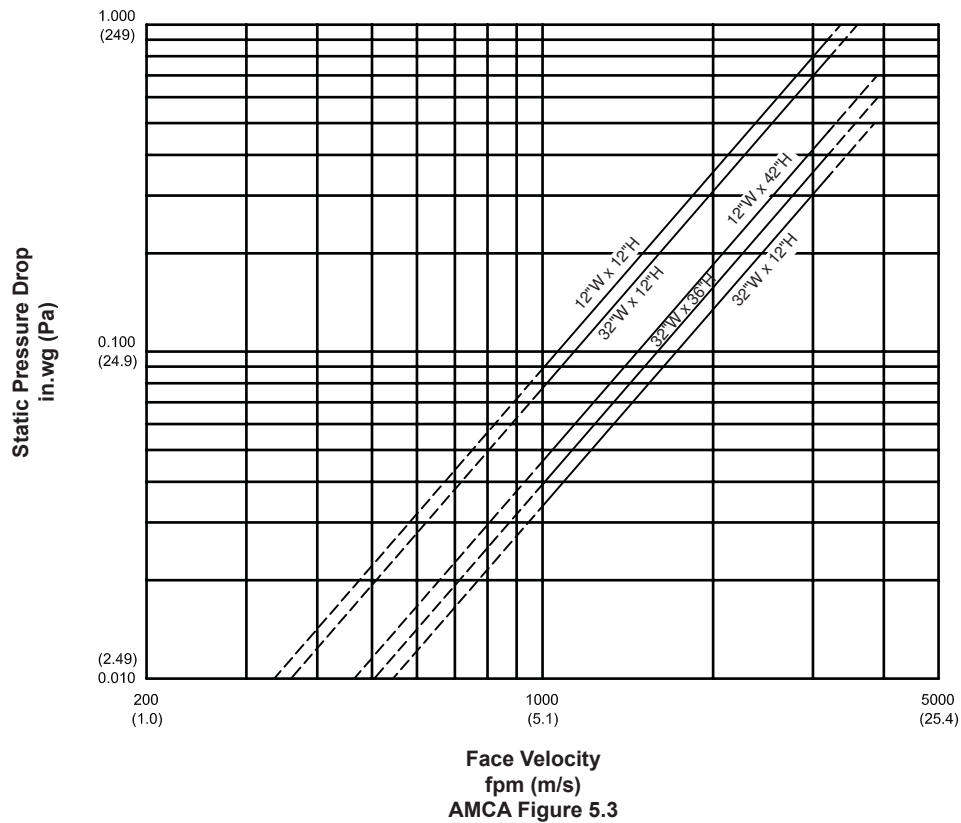
UL Class I
4 cfm per sq. ft. maximum @ 1 in. wg
8 cfm per sq. ft. maximum @ 4 in. wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The Pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with AMCA
Standard 500D.

Leakage Class II • 1½ Hour • Airfoil Blade • 250°F or 350°F • Front Access Grille Fire/Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7⁄8" x 16-GA galvanized steel hat channel
BLADES: 20-GA double-skinned, equal to 14-GA; Parallel action
AXLES: Square, plated solid steel stub
BEARINGS: Oil impregnated bronze
LINKAGE: Plated steel angle and crank plates with stainless steel pivots; In-jamb type
STOPS: 20-GA galvanized steel at head and sill
BLADE SEALS: Silicone
JAMB SEALS: Stainless steel
SLEEVE: 20-GA galvanized steel by 15" long (1½" grille clearance) or 17" long (3½" grill clearance) with 13⁄16" front flange
CAULKING: Hardcast Irongrip 601 or UL-listed equivalent
FINISH: Mill on galvanized steel
ACTUATOR: Electric with heat response device (EHRD) or pneumatic with heat response device (PHRD); Factory-installed for Power-Open/Spring-Close (fail close) operation; Internally mounted and accessible from grille side

OPTIONS

Integral Dual Position Indication (IDPI) Switches
 Sensotherm Re-Openable Heat Response Device (ESOT) for Electric Actuator
 Sensotherm Re-Openable Heat Response Device (ESOP) for Pneumatic Actuator
 Model SM-501 Flow-Rated Smoke Detector (10" Minimum Damper Height)
 Shipped Loose
 Model 2151 No-Flow Smoke Detector (14" Minimum Damper Height)
 Tab-Lock Retaining Angles
 Stainless Steel Bearings
 Copper Tubing (for Pneumatic Actuators)
 Sleeves of Various Gauge Thicknesses
 Round or Oval Transitions
 Short-Width (<10") and/or Short-Height (<10") Transitions

NOTES


1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve and insulation will increase the size of the assembly. See II-FAGM for sizing openings.
2. Damper with smoke detector must have a minimum sleeve of 16" (1½" setback) or 18" (3" setback).
3. Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

DAMPER SIZES

2000 fpm, 4 in.wg			
Orientation	Hor & Vert	Horizontal	Vertical
Panel	Min Panel	Max Panel	Max Panel
Rectangular	10"W x 10"H (10"W x 10"H frame)	32"W x 42"H	32"W x 42"H
Round	8" dia. (10"W x 10"H frame)	30" dia.	30" dia.
Oval	8"W x 8"H (10"W x 10"H frame)	30"W x 40"H	30"W x 40"H

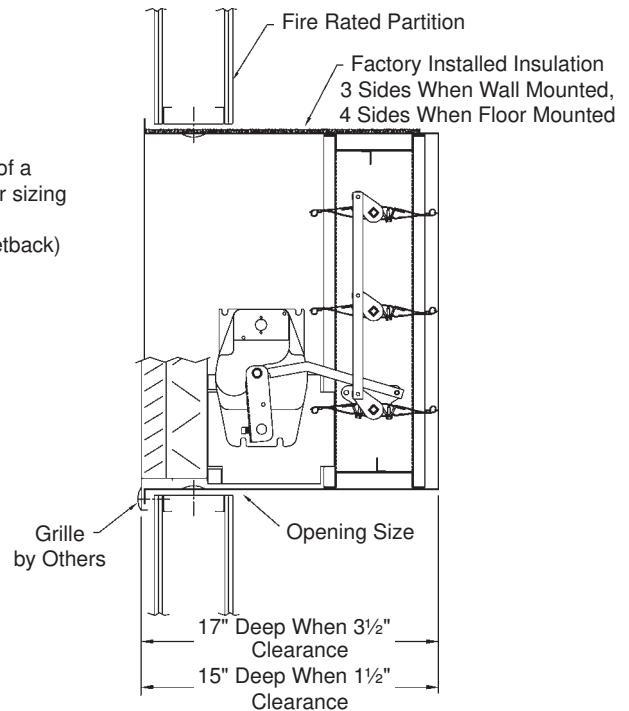
*Dampers smaller than minimum frame size require a transition.
 Reference SD-TRFS.

UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC FIRE AND SMOKE DAMPER
 FIRE RESISTANCE RATING 1½ HR
 LEAKAGE RESISTANCE CLASS II

abi air balance **FILE #R4708** 

This combination fire/smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #111-99-M
- California State Fire Marshal Listing #3225-1328:118
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



MODEL FA2G/FA2F

Leakage Class II • 1½ Hour • Airfoil Blade • 250°F or 350°F • Front Access Grille Fire/Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg

Maximum Velocity: 2000 fpm

Leakage Ratings:

UL Class II

10 cfm per sq. ft. maximum @ 1 in. wg

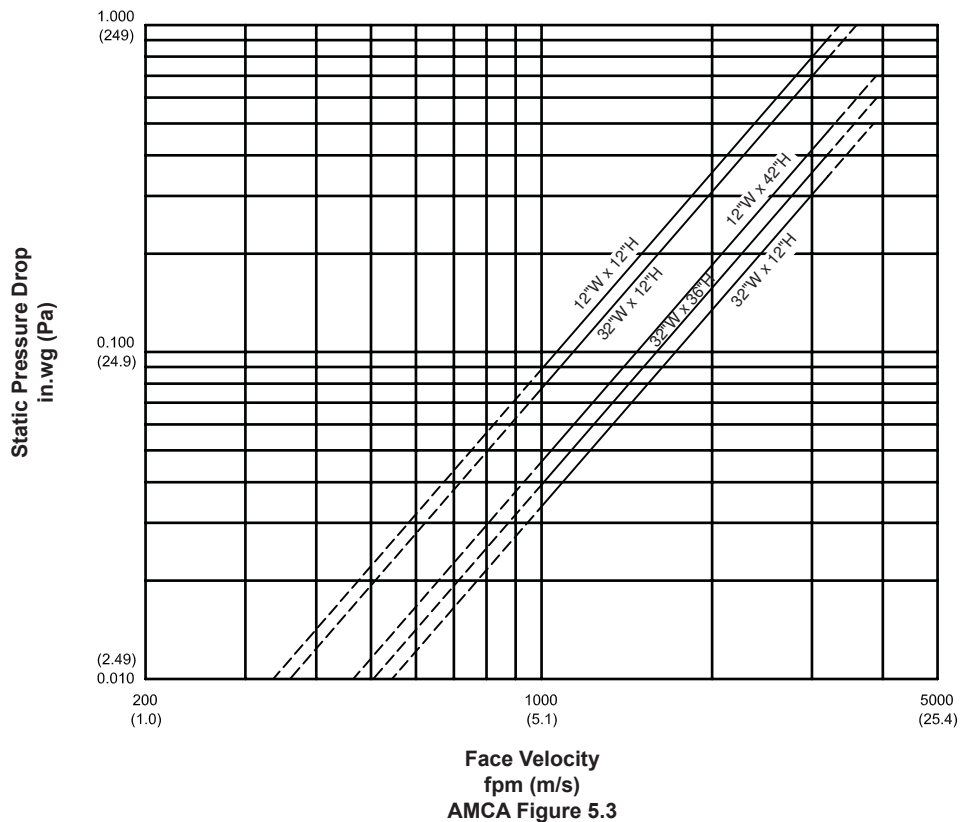
20 cfm per sq. ft. maximum @ 4 in. wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The Pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with AMCA
Standard 500D.

MODEL FS2C

Class II • 250°F • Galvanized Steel • 1½ Hr Fire/Smoke Damper / 1 Hr Tunnel-Type Corridor Ceiling Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7⁄8" x 16-GA galvanized steel hat channel
BLADES: 16-GA galvanized steel; parallel action
AXLES: Plated Solid Steel Stub
BEARINGS: Oil impregnated bronze
LINKAGE: Plated steel angle and crank plates with stainless steel pivots, in-jamb type
STOPS: 20-GA galvanized steel at head and sill
BLADE SEALS: Silicone
JAMB SEALS: Stainless steel
SLEEVE: 20-GA unflanged; 16" deep
CAULKING: UL approved
ACTUATOR: Electric with heat response device (EHRD); factory-installed for Power-Open/Spring-Close (fail close) operation; Internal left hand mounted as viewed for jackshaft side of damper; dampers ≤ 13" high external left hand mounted
FINISH: Mill

OPTIONS

Sleeve of various depths and gauges with ¾" flange on bottom side
 Round or oval transitions (top and bottom for unflanged sleeves; top only for flanged sleeves)
 212°F fusible link
 Perimeter mounting angles
 External mounted actuator
 Sensotherm re-openable heat response device (ESOT) for electric actuator

NOTES

- "A" width and "B" height are opening dimensions. Dampers are provided approximately ¼" undersize.
- When used as a 1½ hour Fire/Smoke Damper it is approved to be mounted either vertically (wall or partitions) or horizontally (floors).

DAMPER SIZES

Orientation	Horizontal (floor) or Vertical (wall)		
Panels	Minimum Panel	Maximum Panel	Max Assy Panel
Rectangular	6"W x 6"H (8"W x 8"H frame)	24"W x 24"H	n/a
Round	6" dia. (8"W x 8"H frame)	22" dia.	n/a
Oval	6"W x 6"H (8"W x 8"H frame)	22"W x 22"H	n/a

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED CORRIDOR DAMPER

FIRE RESISTANCE RATING 1 HR
 ALSO AS TO LEAKAGE RESISTANCE

CLASS II 250°F

abi air balance

FILE #R4708



UNDERWRITERS LABORATORIES INC.®

CLASSIFIED FIRE AND SMOKE DAMPER

FIRE RESISTANCE RATING 1½ HR
 LEAKAGE RESISTANCE CLASS II

abi air balance

FILE #R4708

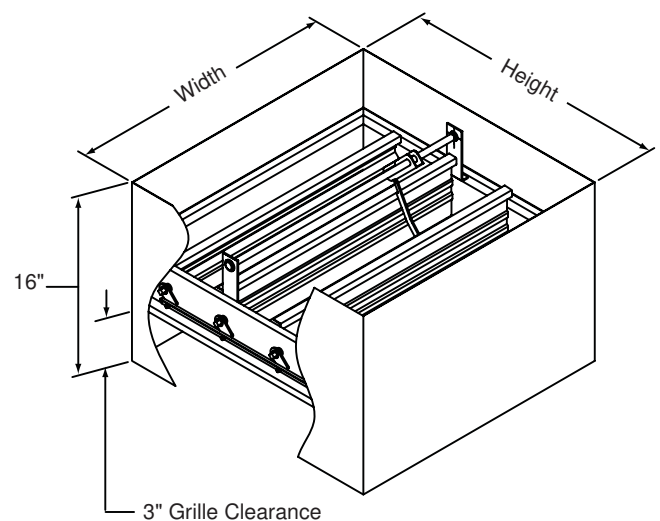


This fire/smoke damper meets the construction and performance requirements of

- Underwriters Laboratories Inc. Standards 555 and 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3226-1328:116
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in fire resistive ratings of less than 3 hours.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



Blade Profile



air balance

Dampers Louvers
 UL Life Safety Products
 Division of Metek
 Member of AMCA

MODEL FS2C

Class II • 250°F • Galvanized Steel • 1½ Hr Fire/Smoke Damper / 1 Hr Tunnel-Type Corridor Ceiling Damper

Operations Rating:

Maximum Differential Pressure: 4 in.wg

Maximum Face Velocity: 2000 fpm

Leakage Rating:

UL Class II

10 cfm per sq.ft. maximum @ 1 in.wg

20 cfm per sq.ft. maximum @ 4 in.wg

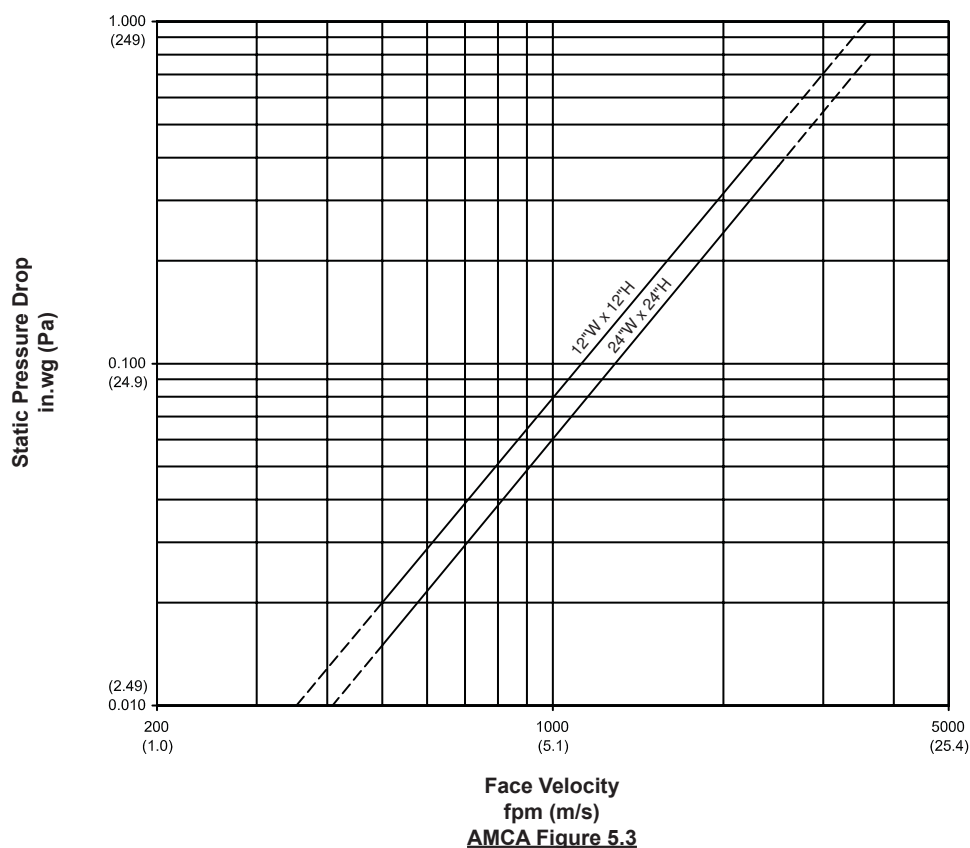
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Damper Size	Noise Criterion (NC)			
	Velocity (fpm)			
	1000	2000	3000	4000
12"W x 12"H	31	53	64	71
24"W x 24"H	33	54	65	n/a

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance to AMCA
Standard 500D.

air balance

Dampers  Louvers
UL Life Safety Products
Division of Mestek
Member of AMCA

Remote Test Box with DPI Switches - Lights Only

Combination Fire/Smoke Damper Models: FR, FS, FT, FA, TA

Smoke Damper Models: SR, S, SA,

Application

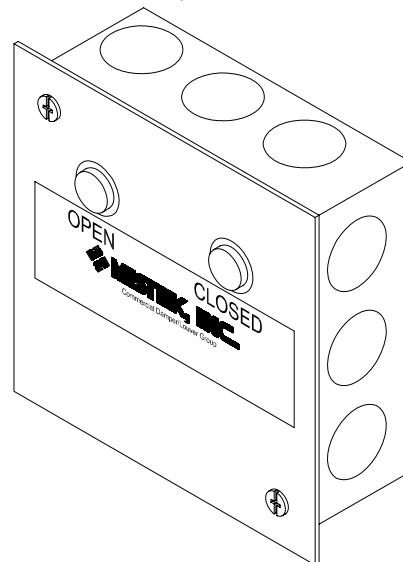
The field mounted and field wired damper position indication lights will permit remote open and closed blade position indication of the combination fire/smoke or smoke damper.

Description

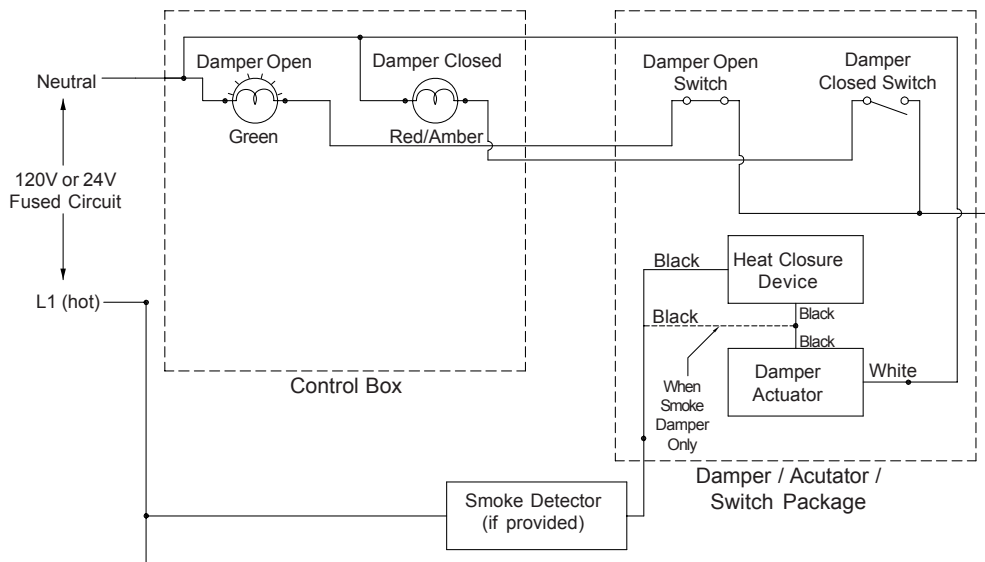
The Remote Test Box consists of a 4"W x 4"H steel box with multiple conduit knockouts. The steel cover is mounted and labeled. A green lamp indicates the damper is opened and the red/amber lamp indicates the damper is closed.

Notes

1. This control box is available for 120V or 24V circuits.
2. Requires damper to be provided with damper position indication switches.
3. Proper grounding is required.



Wiring schematic when damper position indication lights are connected to combination fire/smoke damper or smoke damper with single heat closure device. (Shown in normal, damper open position.)



Remote Test Box with DPI Switches - Lights Only
Combination Fire/Smoke Damper Models: FR, FS, FT, FA, TA
Smoke Damper Models: SR, S, SA,

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Remote Test Box with DPI Switches - Two Position Momentary

Combination Fire/Smoke Damper Models: FR, FS, FT, FA, TA

Smoke Damper Models: SR, S, SA,

Application

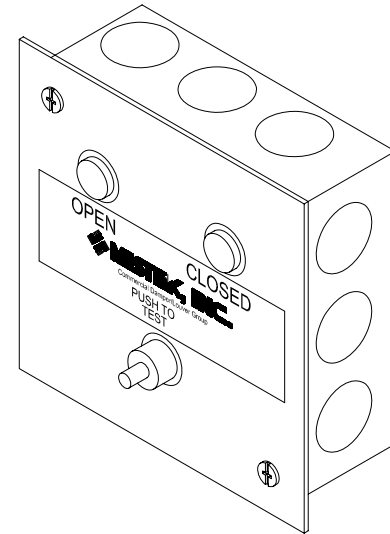
The field mounted and field wired remote test box will permit momentary interruption of power to the combination fire/smoke or smoke damper. As long as the spring-loaded switch is depressed, power is disconnected and the damper will travel to its fail position.

Description

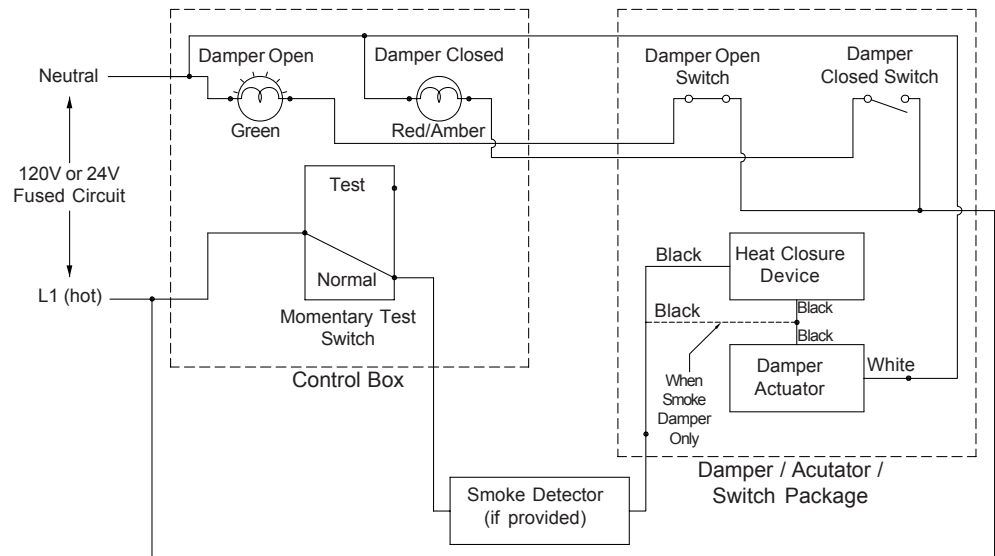
The Remote Test Box consists of a 4"W x 4"H steel box with multiple conduit knockouts. The steel cover is mounted and labeled for the momentary, spring-loaded test switch. A green lamp indicates the damper is opened and the red/amber lamp indicates the damper is closed.

Notes

1. This control box is available for 120V or 24V circuits.
2. Two Position Momentary Switch rating 4A at 250VAC or 8A at 125VAC.
3. Requires damper to be provided with damper position indication switches.
4. Proper grounding is required.



Wiring schematic when control box is connected to combination fire/smoke damper or smoke damper with single heat closure device. (Shown in normal, damper open position.)



Remote Test Box with DPI Switches - Two Position Momentary
Combination Fire/Smoke Damper Models: FR, FS, FT, FA, TA
Smoke Damper Models: SR, S, SA,

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Remote Test Box with DPI Switches - Two Position Toggle

Combination Fire/Smoke Damper Models: FR, FS, FT, FA, TA

Smoke Damper Models: SR, S, SA,

Application

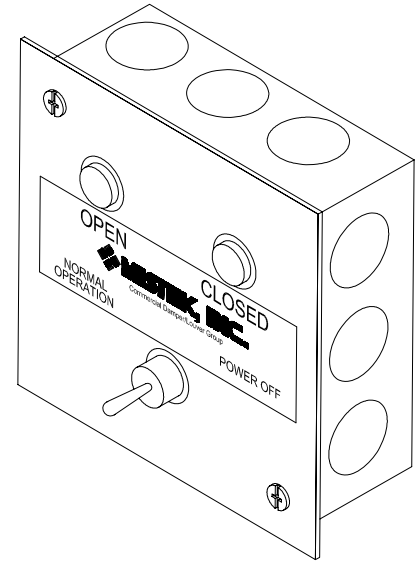
The field mounted and field wired remote test box will permit interruption of power to the combination fire/smoke or smoke damper. As long as the toggle switch is in the "off" position, power is disconnected and the damper will travel to its fail position.

Description

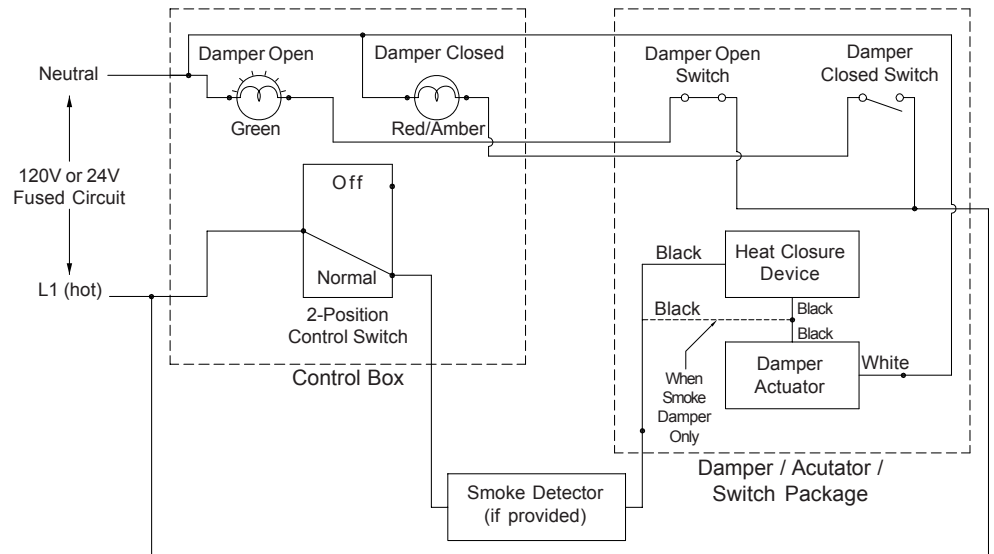
The Remote Test Box consists of a 4"W x 4"H steel box with multiple conduit knockouts. The steel cover is mounted and labeled for the two position toggle switch. A green lamp indicates the damper is opened and the red/amber lamp indicates the damper is closed.

Notes

1. This control box is available for 120V or 24V circuits.
2. Switch rating 20A at 125VAC.
3. Requires damper to be provided with damper position indication switches.
4. Proper grounding is required.



Wiring schematic when control box is connected to combination fire/smoke damper or smoke damper with single heat closure device. (Shown in normal, damper open position.)



Remote Test Box with DPI Switches - Two Position Toggle
Combination Fire/Smoke Damper Models: FR, FS, FT, FA, TA
Smoke Damper Models: SR, S, SA,

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Remote Test Box with DPI Switches - Three Position Toggle

Combination Fire/Smoke Damper Models: FR, FS, FT, FA, TA

Smoke Damper Models: SR, S, SA,

Application

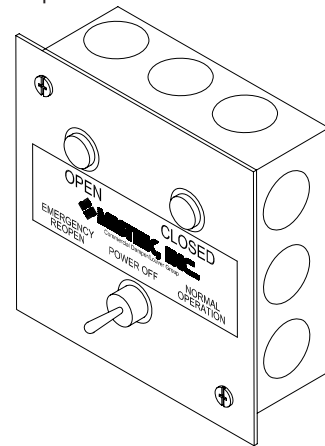
The field mounted and field wired remote test box will permit remote closing and reopening of a combination fire/smoke or smoke damper. The reopen position will bypass the smoke detector (if provided) and the low temperature and high temperature heat closure device (if provided).

Description

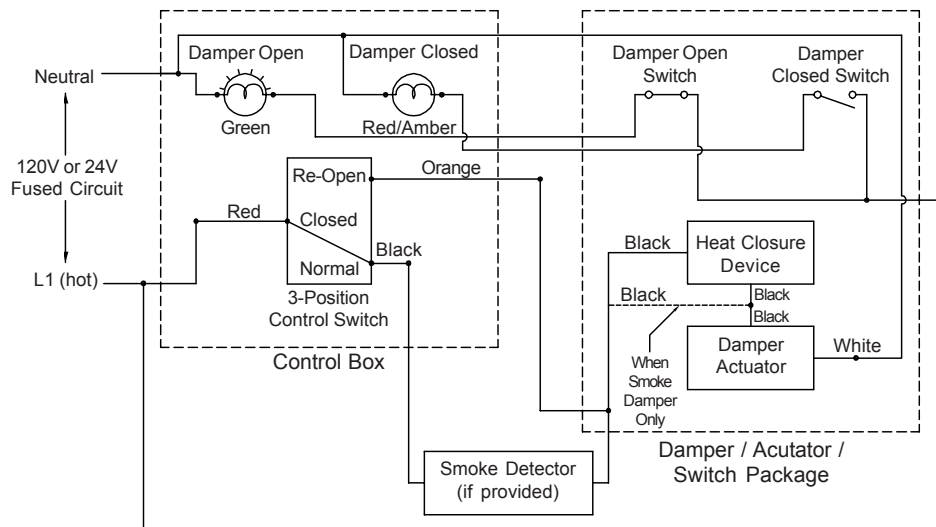
The Remote Test Box consists of a 4"W x 4"H steel box with multiple conduit knockouts. The steel cover is mounted and labeled for the three position (center off) switch. A green lamp indicates the damper is opened and the red/amber lamp indicates the damper is closed.

Notes

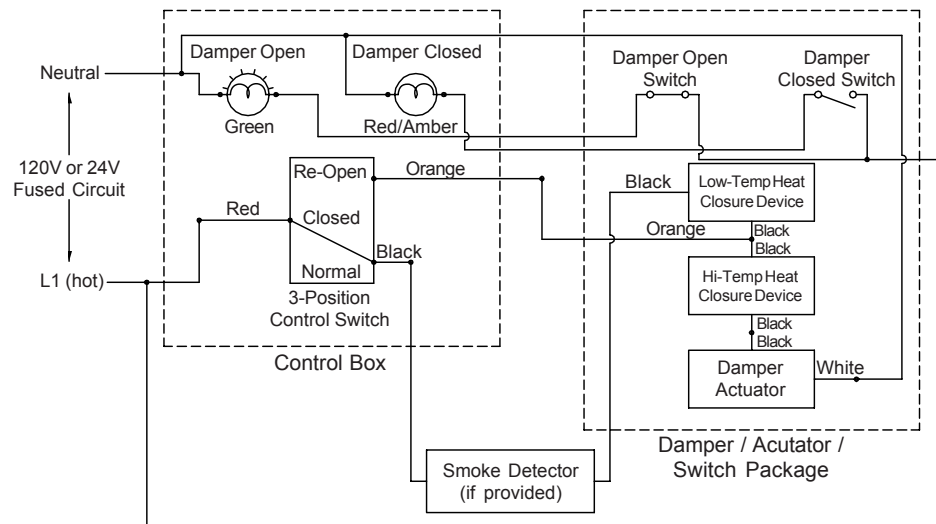
1. This control box is available for 120V or 24V circuits.
2. Switch rating 20A at 125VAC.
3. Requires damper to be provided with damper position indication switches.
4. Proper grounding is required.



Wiring schematic when control box is connected to combination fire/smoke damper or smoke damper with single heat closure device. (Shown in normal, damper open position.)



Wiring schematic when control box is connected to combination fire/smoke damper with low-temp and high-temp heat closure devices, sensotherm feature. (Shown in normal, damper open position.)



Remote Test Box with DPI Switches - Three Position Toggle
Combination Fire/Smoke Damper Models: FR, FS, FT, FA, TA
Smoke Damper Models: SR, S, SA,

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Remote Test Box with DPI Switches - Two Position Key

Combination Fire/Smoke Damper Models: FR, FS, FT, FA, TA

Smoke Damper Models: SR, S, SA,

Application

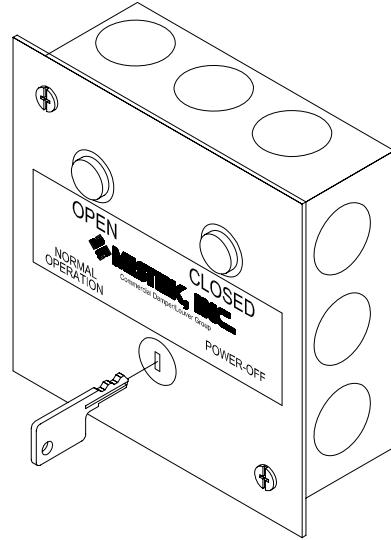
The field mounted and field wired remote test box will permit interruption of power to the combination fire/smoke or smoke damper. As long as the key switch is in the "off" position, power is disconnected and the damper will travel to its fail position.

Description

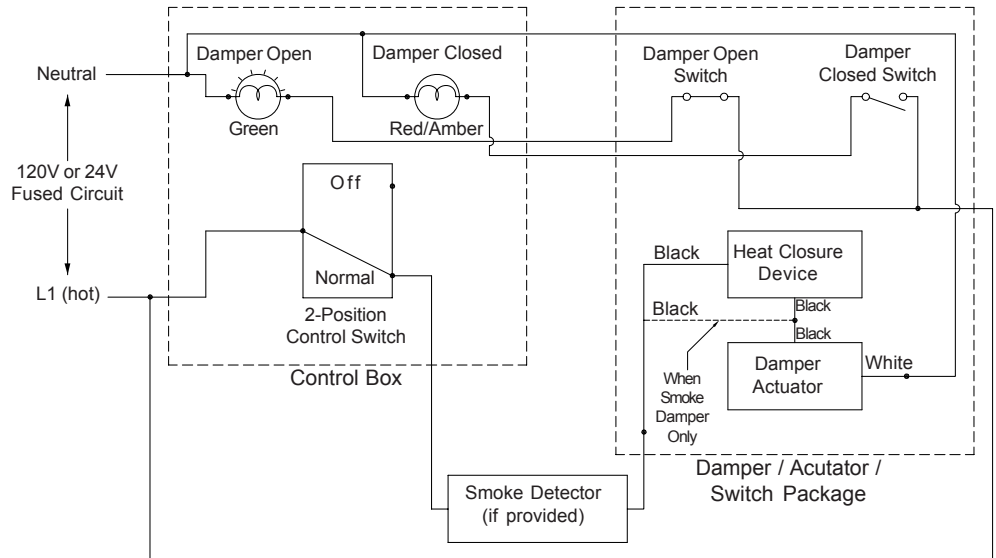
The Remote Test Box consists of a 4"W x 4"H steel box with multiple conduit knockouts. The steel cover is mounted and labeled for the two position key switch. A green lamp indicates the damper is opened and the red/amber lamp indicates the damper is closed.

Notes

1. This control box is available for 120V or 24V circuits.
2. Two Position Key Switch rating 20A at 125VAC.
3. Requires damper to be provided with damper position indication switches.
4. Proper grounding is required.



Wiring schematic when control box is connected to combination fire/smoke damper or smoke damper with single heat closure device. (Shown in normal, damper open position.)



Remote Test Box with DPI Switches - Two Position Key
Combination Fire/Smoke Damper Models: FR, FS, FT, FA, TA
Smoke Damper Models: SR, S, SA,

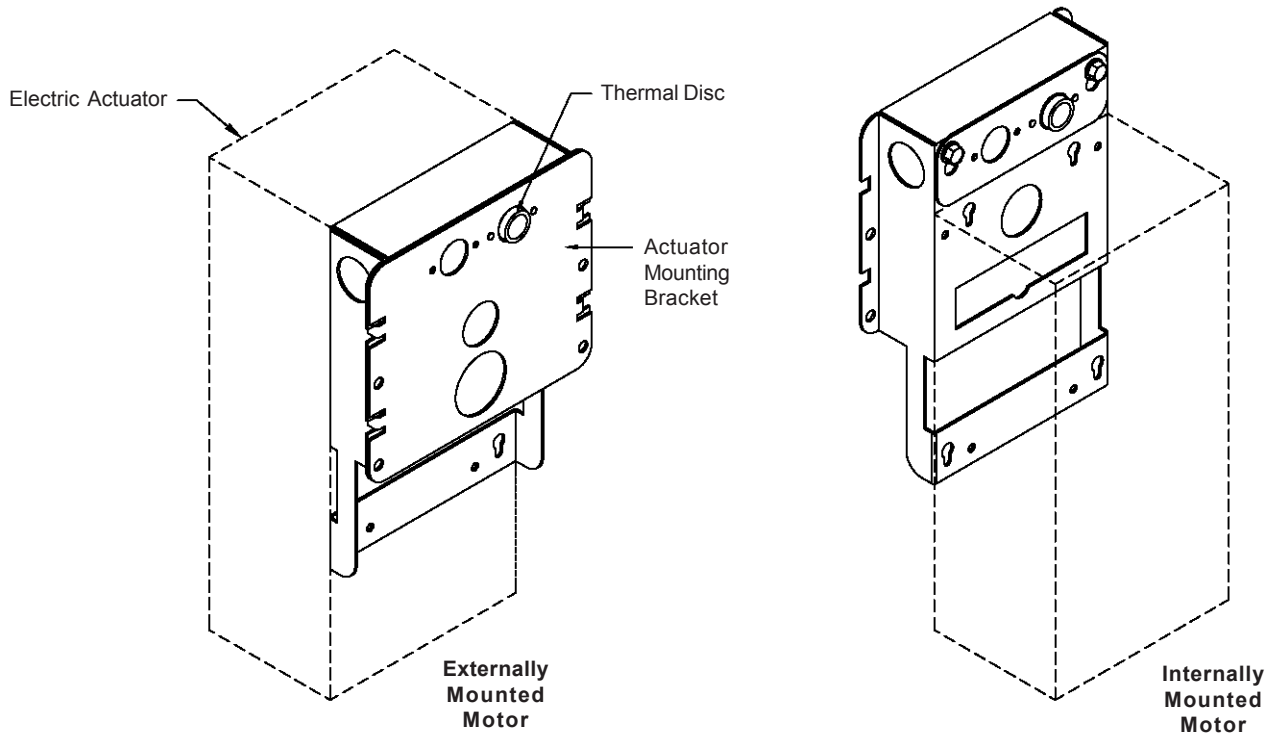
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Electric Heat Response Device (EHRD)

Combination Fire/Smoke Damper

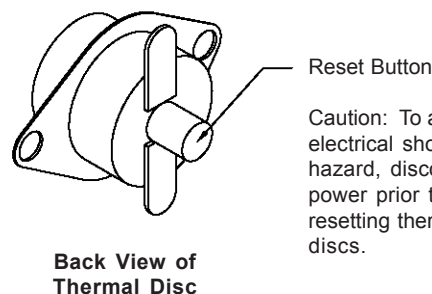
Application

The Electric Heat Response Device (EHRD) is a heat sensing, bi-metallic disc-type switch that is wired in series with the actuator's electrical supply. Upon exposure to elevated temperature, the thermal disc mechanically opens the electric circuit and interrupts the power supply to the actuator, thus causing the actuator's internal spring to drive the damper to the closed and locked position.

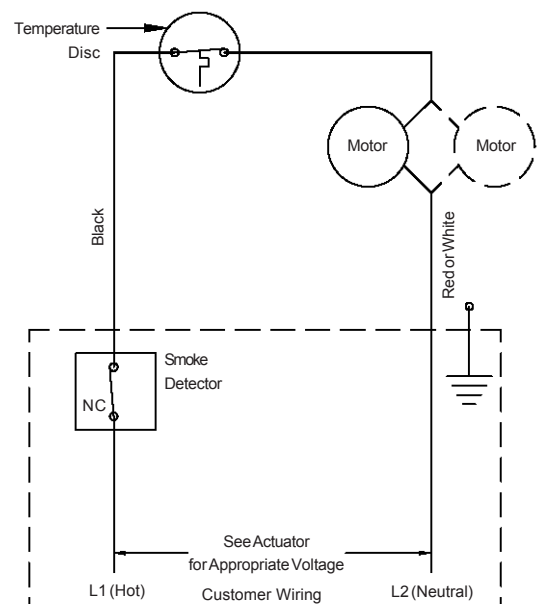


Notes

1. All wiring to be done in accordance with N.E.C. (NFPA 70).
2. Switches are rated at 1/3 HP, 125 VAC.
3. Thermal discs are available in 165°F, 212°F, 250°F, and 350°F temperature ratings (thermal disc rating cannot exceed the temperature rating of the damper).
4. Upon cooling, the thermal disc switch remains open and the damper remains in the closed and locked position. Assuming that incident temperatures were not excessive, the damper can be re-opened by manually depressing the reset button on the back of the thermal disc. Prior to resetting the thermal disc, the damper and its power supply should be inspected for heat related damage.



Caution: To avoid electrical shock hazard, disconnect power prior to resetting thermal discs.



Electric Heat Response Device (EHRD)

Combination Fire/Smoke Damper

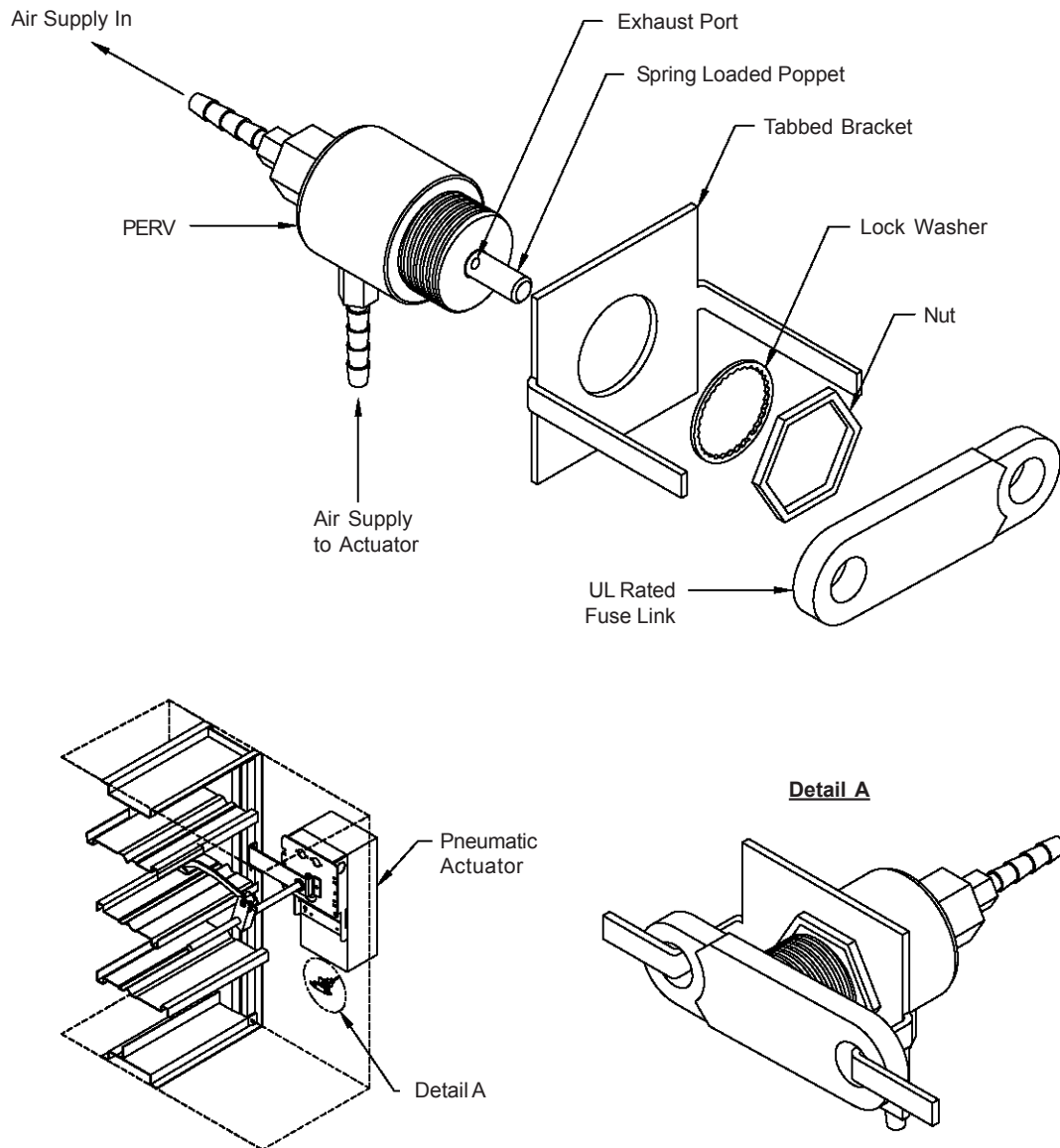
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Pneumatic Heat Response Device (PHRD)

Combination Fire/Smoke Damper

Application

The Pneumatic Heat Response Device (PHRD) is a heat sensing device that is plumbed between a pneumatic actuator and its supply air line and protrudes inside of a duct. This device consists of a Pneumatic Emergency Relief Valve (PERV), a fusible link, and a tabbed bracket. Upon exposure to elevated temperature, the fusible link separates and releases the PERV's spring loaded poppet valve, thus causing the actuator's supply to exhaust to atmosphere. As the actuator's supply air is depleted, its spring return drives the damper to the closed and locked position.



Notes

1. Fusible links are available in 165°F and 212°F temperature ratings.
2. To re-open the damper, it is necessary to replace the fusible link and restore air to the actuator.

Pneumatic Heat Response Device (PHRD)

Combination Fire/Smoke Damper

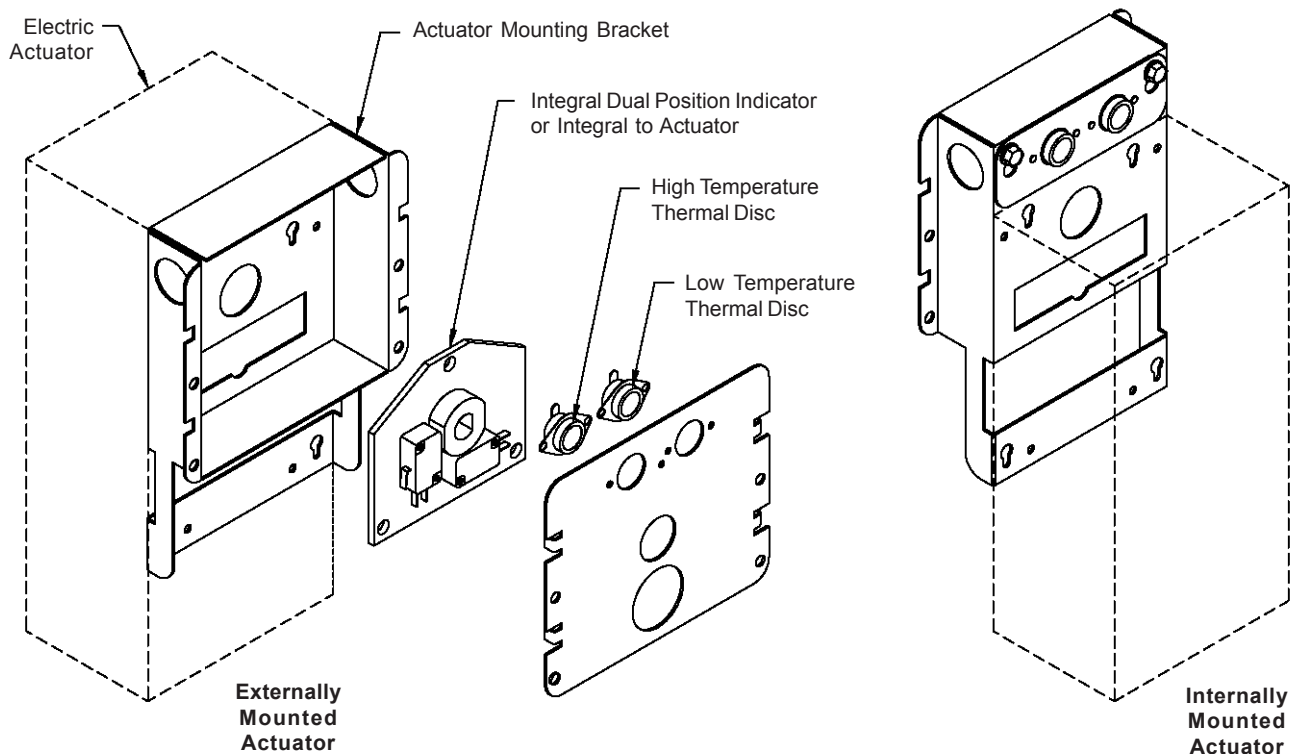
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Electric Sensotherm (ESOT)

Combination Fire/Smoke Damper

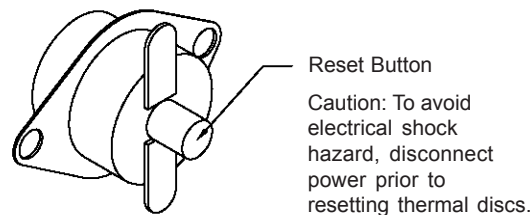
Application

The Electric Sensotherm (ESOT) is a packaged combination of two heat sensing, bi-metallic disc type switches of different temperature ratings and a blade position indicator. Upon exposure to elevated temperature, the lower temperature rated thermal disc mechanically opens the electric circuit and interrupts the power supply to the actuator, thus causing the actuator's internal spring to drive the damper to the closed and locked position. The blade position indicator will provide feedback to an installer-supplied controls system that the damper is closed. When necessary, an installer-supplied three position Master Control Switch (MCS) can be used to redirect power from the open lower temperature rated thermal disc to the closed higher temperature rated thermal disc, thus re-opening the damper to purge smoke or pressurize zones surrounding the fire incident area. If the temperature conditions again raise to elevated levels, the higher temperature rated thermal disc will open and the damper will re-close to maintain the integrity of the fire barrier.



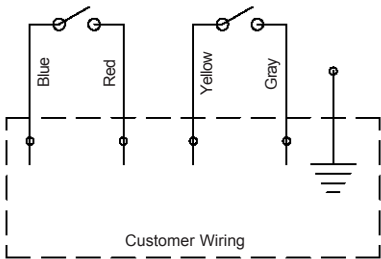
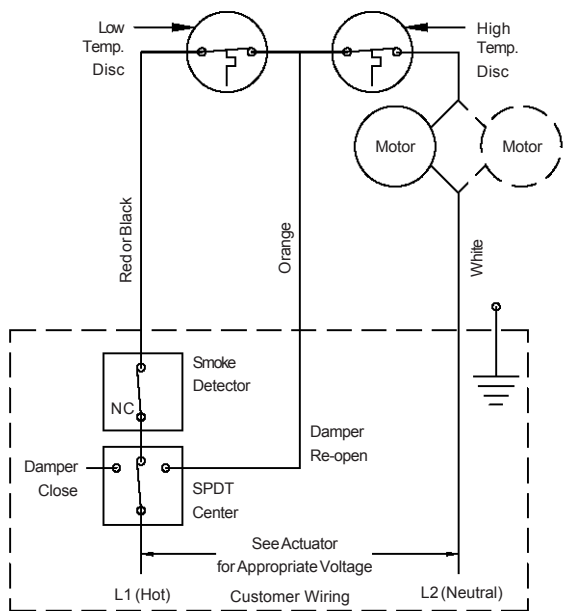
Notes

1. All wiring to be done in accordance with N.E.C. (NFPA 70).
2. Switches are rated at 1/3 HP, 125 VAC.
3. Low temperature thermal discs are available in 165°F and 212°F temperature ratings. High temperature thermal discs are available in 250°F and 350°F temperature ratings (the high temperature thermal disc rating cannot exceed the temperature rating of the damper).
4. Upon cooling, the thermal disc switches remain open and the damper remains in the closed and locked position. Assuming that incident temperatures were not excessive, the damper can be re-opened by manually depressing the reset buttons on the back of the thermal discs. Prior to resetting the thermal discs, the damper and its power supply should be inspected for heat related damage.



Back View of
Thermal Disc

Electric Sensotherm (ESOT) Combination Fire/Smoke Damper



Integral Dual Position Indication (IDPI) Wiring Chart			
actuator mounting location	damper full open	damper full close	damper mid-stroke
	closed circuit		
external left	red / blue	yellow / gray	none
external right	yellow / gray	red / blue	none
internal left	yellow / gray	red / blue	none
internal right	red / blue	yellow / gray	none

* This wiring is opposite if the actuator is rotated 90°, so that it is parallel to the duct..

ESOT/PSOT Wiring, Test, and Operating Instructions

Damper is supplied with one low temperature thermal disc and one high temperature thermal disc. All dampers require a master control switch (supplied by others) for re-openable operation.

CUSTOMER WIRING

1. Connect input power lead L1 from the normal closed position lead of the (MCS) switch to damper lead L1.
Note: If a smoke detector or other sensing device is to be employed, its NC contact set should be wired in series between the (MCS) position switch normal wire and lead L1.
2. Connect incoming lead L2 to damper lead L2.
3. Connect the reopen switch lead from (MCS) to orange damper lead.
4. Connect the incoming ground lead to the wiring enclosure.
5. Install IDPI (if used) per the schematic.
6. Replace enclosure cover.

CIRCUIT TEST

1. Place (MCS) switch in damper close position.
Result: The closed indicator light (if used) should be on and the damper blades closed.
2. Apply power.
3. Transfer (MCS) switch to damper re-open position.
Result: The damper blades should open; the closed indicator light (if used) should go off and the open indicator light (if used) should go on.
4. Transfer (MCS) switch to the normal position.
Result: The damper blades should remain open and the open indicator light (if used) should remain on.
5. Transfer the (MCS) switch to the closed position.
Result: The damper blades should close; the open indicator light (if used) should go off and the closed indicator light (if used) should go on.

EMERGENCY OPERATION (SMOKE MANAGEMENT)

1. **MCS closed position:** Damper will close regardless of whether the thermal switch device has activated or not and regardless of the command from the smoke system.
2. **MCS re-open position:** If the damper has not been exposed to an elevated temperature higher than its rating, the damper will open. Also, the damper will open regardless of whether the low temperature thermal disc (165°F or 212°F) has activated or not and regardless of a command from additional sensing devices, such as a smoke detector.

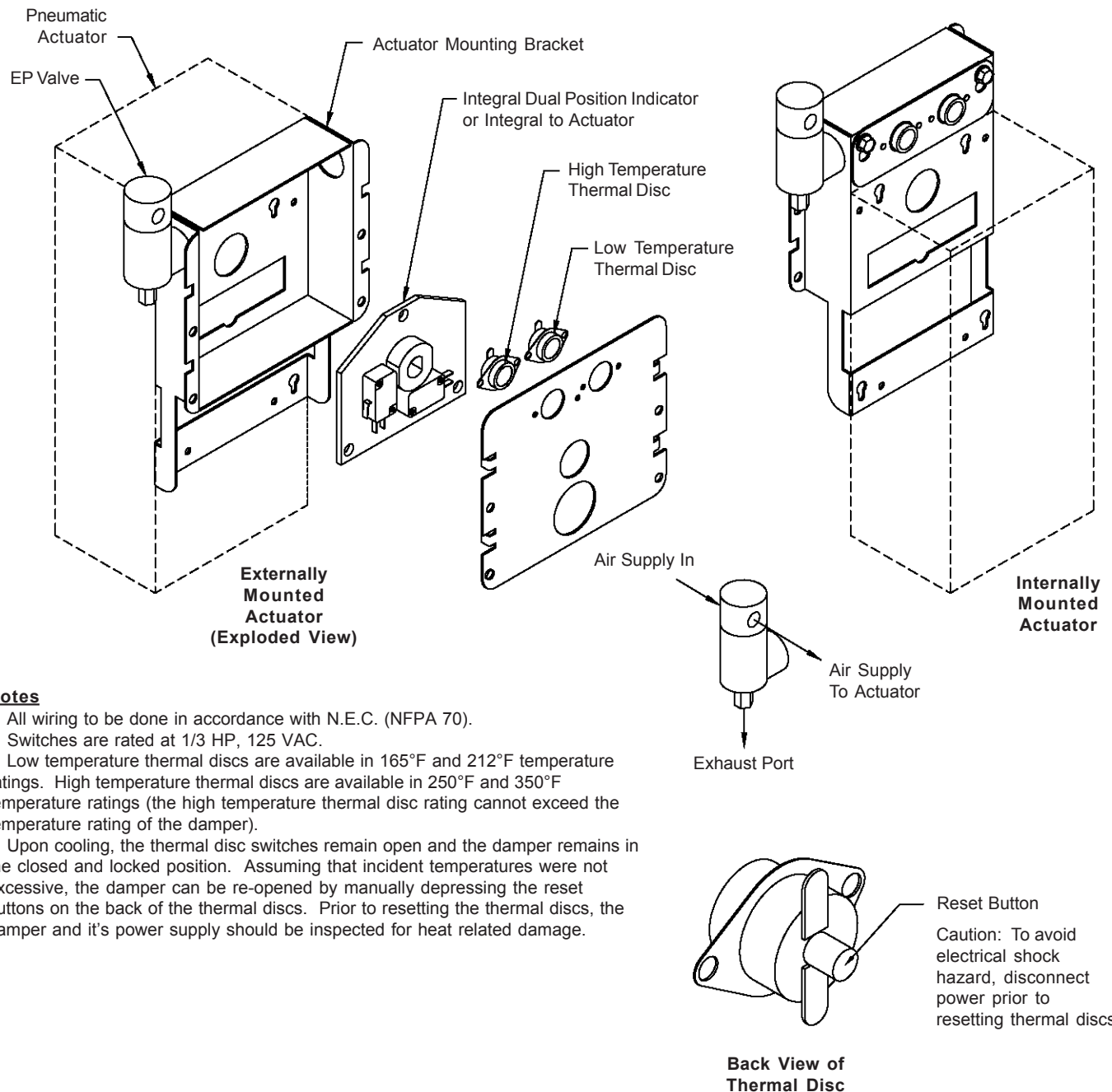
NOTE: If the master control switch (MCS) is in the re-open position and the high temperature thermal disc has not been tripped, the damper will remain open regardless of whether the low temperature thermal disc and/or other sensing devices have tripped or not. If the damper has been exposed to an elevated temperature higher than its temperature degradation rating, or if the electrical or pneumatic supply has been disconnected, the damper will close and remain closed regardless of any (MCS) position.

Pneumatic Sensotherm (PSOT)

Combination Fire/Smoke Damper

Application

The Pneumatic Sensotherm (PSOT) is a packaged combination of two heat sensing, bi-metallic disc type switches of different temperature ratings, and electro-pneumatic relief valve (EP Valve), and a blade position indicator. Upon exposure to elevated temperature, the lower temperature rated thermal disc mechanically opens the electric circuit and interrupts the power supply to the EP Valve, thus causing the actuator's air supply to exhaust to atmosphere. As the actuator's air supply is depleted, its internal spring return drives the damper to the closed and locked position. The blade position indicator will provide feedback to an installer-supplied controls system that the damper is closed. When necessary, an installer-supplied three position Master Control Switch (MCS) can be used to redirect power from the open lower temperature rated thermal disc to the closed higher temperature rated thermal disc. This returns power to the EP Valve and re-supplies air pressure to the actuator, thus opening the damper to purge smoke or pressurize zones surrounding the fire incident area. If the temperature conditions again raise to elevated levels, the higher temperature rated thermal disc will open, the EP Valve will once again exhaust to atmosphere, and the damper will re-close to maintain the integrity of the fire barrier.

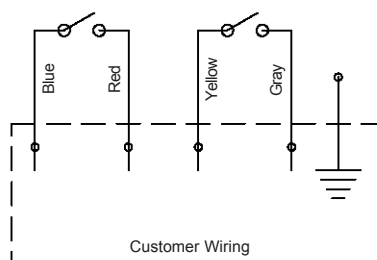
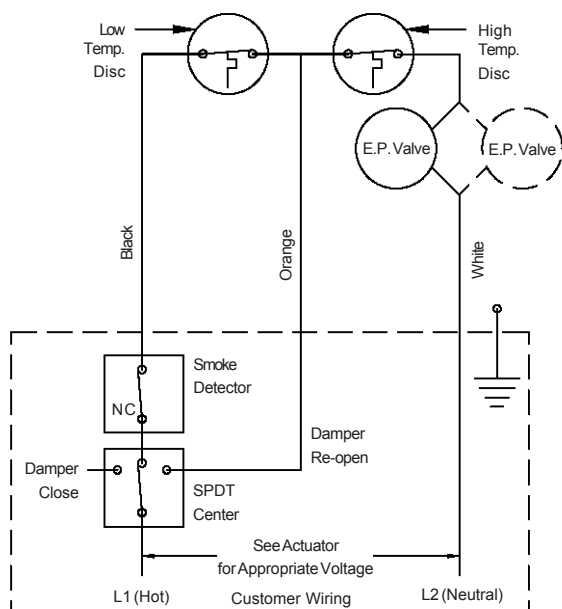


Notes

1. All wiring to be done in accordance with N.E.C. (NFPA 70).
2. Switches are rated at 1/3 HP, 125 VAC.
3. Low temperature thermal discs are available in 165°F and 212°F temperature ratings. High temperature thermal discs are available in 250°F and 350°F temperature ratings (the high temperature thermal disc rating cannot exceed the temperature rating of the damper).
4. Upon cooling, the thermal disc switches remain open and the damper remains in the closed and locked position. Assuming that incident temperatures were not excessive, the damper can be re-opened by manually depressing the reset buttons on the back of the thermal discs. Prior to resetting the thermal discs, the damper and its power supply should be inspected for heat related damage.

Pneumatic Sensotherm (PSOT)

Combination Fire/Smoke Damper



Integral Dual Position Indication (IDPI) Wiring Chart			
actuator mounting location	damper full open	damper full close	damper mid-stroke
	closed circuit		
external left	red / blue	yellow / gray	none
external right	yellow / gray	red / blue	none
internal left	yellow / gray	red / blue	none
internal right	red / blue	yellow / gray	none

* This wiring is opposite if the actuator is rotated 90° so that it is parallel to the duct.

ESOT/PSOT Wiring, Test, and Operating Instructions

Damper is supplied with one low temperature thermal disc and one high temperature thermal disc. All dampers require a master control switch (supplied by others) for re-openable operation.

CUSTOMER WIRING

1. Connect input power lead L1 from the normal closed position lead of the (MCS) switch to damper lead L1.
Note: If a smoke detector or other sensing device is to be employed, its NC contact set should be wired in series between the (MCS) position switch normal wire and lead L1.
2. Connect incoming lead L2 to damper lead L2.
3. Connect the reopen switch lead from (MCS) to orange damper lead.
4. Connect the incoming ground lead to the wiring enclosure.
5. Install IDPI (if used) per the schematic.
6. Replace enclosure cover.

CIRCUIT TEST

1. Place (MCS) switch in damper close position.
2. Apply power.
Result: The closed indicator light (if used) should be on and the damper blades closed.
3. Transfer (MCS) switch to reopen position.
Result: The damper blades should open; the closed indicator light (if used) should go off and the open indicator light (if used) should go on.
4. Transfer (MCS) switch to the normal position.
Result: The damper blades should remain open and the open indicator light (if used) should remain on.
5. Transfer the (MCS) switch to the closed position.
Result: The damper blades should close; the open indicator light (if used) should go off and the closed indicator light (if used) should go on.

EMERGENCY OPERATION (SMOKE MANAGEMENT)

1. **MCS closed position:** Damper will close regardless of whether the thermal switch device has activated or not and regardless of the command from the smoke system.
2. **MCS re-open position:** If the damper has not been exposed to an elevated temperature higher than its rating, the damper will open. Also, the damper will open regardless of whether the low temperature thermal disc (165°F or 212°F) has activated or not and regardless of a command from additional sensing devices, such as a smoke detector.

NOTE: If the master control switch (MCS) is in the re-open position and the high temperature thermal disc has not been tripped, the damper will remain open regardless of whether the low temperature thermal disc and/or other sensing devices have tripped or not. If the damper has been exposed to an elevated temperature higher than its temperature degradation rating, or if the electrical or pneumatic supply has been disconnected, the damper will close and remain closed regardless of any (MCS) position.

PK1200 & PK1201

Fire/Smoke Damper Models: FR, CR, MR, AR, FS, CG, MS, AS, FT, CH, MT, AT, FA, CA, MA, UA, TA, CT, LA

Smoke Damper Models: SR, SR, KR, UR, S, SG, KH, A, SA, GA, KA, AA

APPLICATION

The switch package is mechanically connected to either a control damper blade (Model PK1200) or to an external damper axle or extended shaft (Model PK1201). Rotation of the damper blade or shaft rotates the switch cam which makes or breaks the electrical contacts of the two switches. One switch indicates damper closure and the other switch indicates the damper being opened. Each switch has three differently colored leads, one each coming for the common, normally opened and normally closed contacts. The dry contacts can be used to remotely indicate damper blade position status (open or closed) and/or be used to turn on or off fans and other devices that are dependent on damper blade position.

MICRO SWITCH SPECIFICATIONS

Temperature Rating: -67°F to 180°F (-55°C to 82°C)

Single-Pole, Double-throw

AMP Ratings and 1/3 hp at 125, or 277 VAC

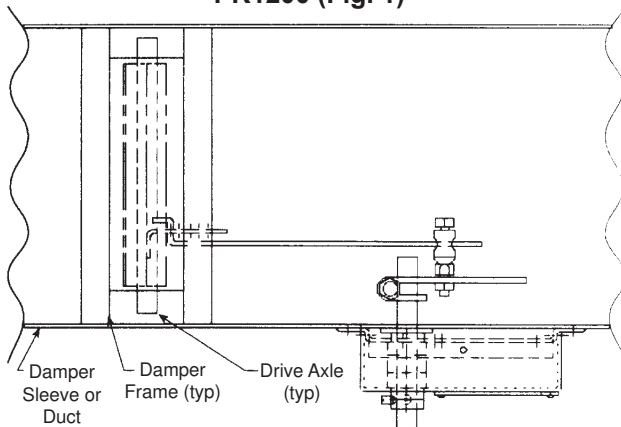
1/2 AMP at 125 VDC

1/4 AMP at 250 VDC

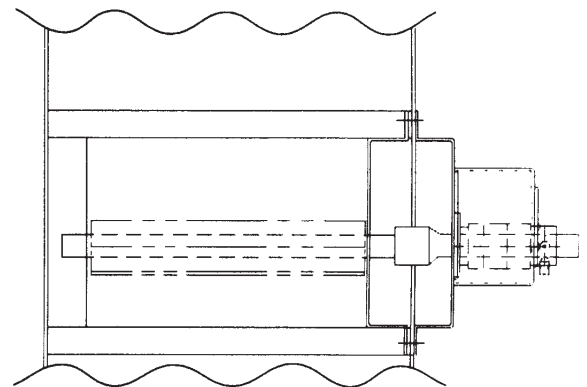
10 AMPS at 24 VDC

4 AMPS at 125 VAC "L" (lamp load)

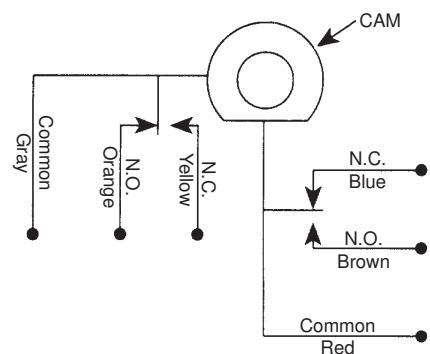
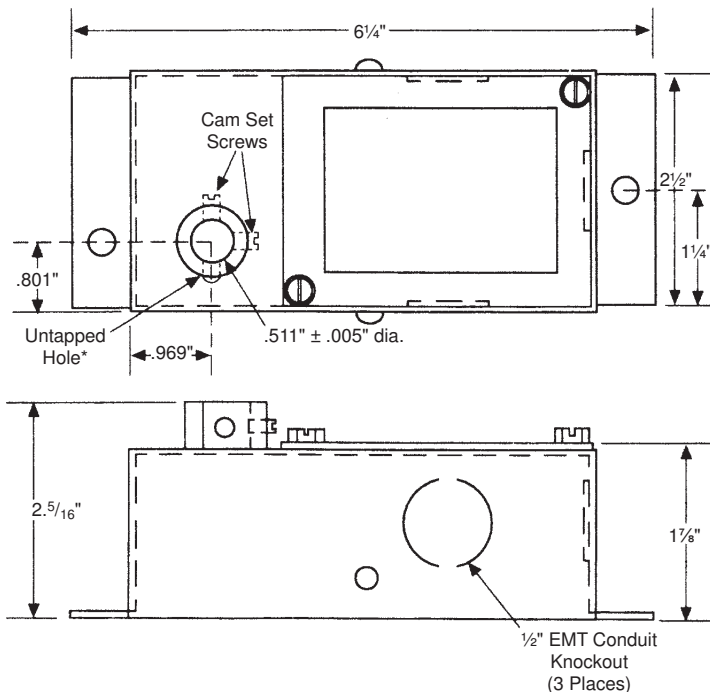
PK1200 (Fig. 1)



PK1201 (Fig. 2)



DIMENSIONAL AND WIRING DETAILS (Fig. 3)



NOTES:

1. Bottom switch provides a contact closure to positively indicate the damper in full-closed position.
2. Top switch provides a contact closure to positively indicate the damper in full-open position.
3. The above wiring schematic is shown with the damper in full-closed cam set-up position.

*Indicates cam set-up orientation. Untapped cam hole lines up with notch in the position box.

PK1200 & PK1201

Fire/Smoke Damper Models: FR, CR, MR, AR, FS, CG, MS, AS, FT, CH, MT, AT, FA, CA, MA, UA, TA, CT, LA

Smoke Damper Models: SR, SR, KR, UR, S, SG, KH, A, SA, GA, KA, AA

PK1200

This is offered for most control dampers, but can be supplied for smoke and combination fire/smoke dampers, also. It is designed to provide signal for full-open or full-closed based on 90° of rotation. It is a stand-alone device that provides the necessary parts to mount a wiring housing to the duct or sleeve near the damper blade, which is then mechanically interconnected to the blade. Because of the direct attachment to the blade, this method provides the most certainty that accurate position is monitored. This is also used when position indication is not ordered with the product, but is required for product in the field.

Blade Actuated Mounting Instructions (Fig. 1)

Parts Included:

- | | | |
|------------------------------------|--------------------------------|----------------------------|
| 1. Position Indication Box (Qty 1) | 4. Blade Clip (Qty 1) | 7. Foam Gasket (Qty 1) |
| 2. Crank Arm (Qty 1) | 5. Linkage Rod (Qty 1) | 8. Shaft (½" x 6") (Qty 1) |
| 3. Ball Joint (Qty 1) | 6. Self-Drilling Screw (Qty 6) | |
1. Select damper blade on which blade clip (item 4) is to be mounted. Top of blade should be open toward end switch. Top of blade should open toward end switch.
 2. Attach blade clip to blade using two self drilling screws (item 6). Blade clip centerline should be approximately 2" above centerline of blade axle. Locate bracket approximately 3" from end of blade.
 3. Locate and drill a ¾ diameter hole in the duct or sleeve approximately 10-12" from the blade. The drilled hole should be located the same distance from the top or bottom of the damper frame as is the axle of the damper blade to which the blade clip has been fastened.
 4. Remove paper backing from the shaft gasket (item 7) and attach to the duct or sleeve, centering it over the hole drilled from Step 3.
 5. Insert 6" shaft (item 8) through cam of position indication box (item 1), and through gasket and hole from step 4. Revolve position indication box around cam to desired position and attach using two self-drilling screws (item 6) through the mounting holes at each end of the indication box.
 6. Attach the crank arm (item 2) to the shaft (item 8) so that it extends approximately 3" beyond the inside edge of the damper frame.
 7. Attach the ball joint (item 3) to the crank arm approximately 2" from the center of the shaft.
 8. Insert the crimped end of the linkage rod (item 5) through the blade clip and the straight end through the hole in the ball joint.
 9. With the damper blades in closed position, rotate the cam and align the untapped hole in can with the notch in the position indication box (Fig. 3)
 10. Tighten the two set screws in the cam, DO NOT OVER-TIGHTEN.
 11. Loosen cover screws and open cover on position indication box to expose connecting wire.

NOTE: The cam is designed to trip the position switches at each end of a 90° rotation. A continuity tester may be required to check switch operation. Minor adjustments in the linkage set-up may be required.

PK1201

This is offered for most control dampers, but can be supplied for smoke and combination fire/smoke damper, also. It is designed to provide a signal of full-open or full-closed based on 90° of rotation. It is a stand-alone device that can accept and lock onto a ½" diameter shaft (typically, ½" diameter jackshaft or ½" diameter extended shaft). The housing must be anchored to some fixed support.

Extended Shaft Mounting Instructions (Fig. 2)

Parts Included:

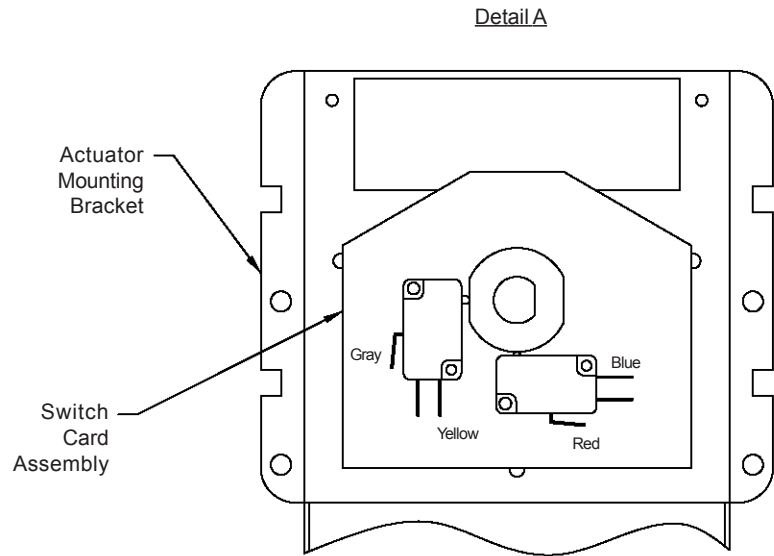
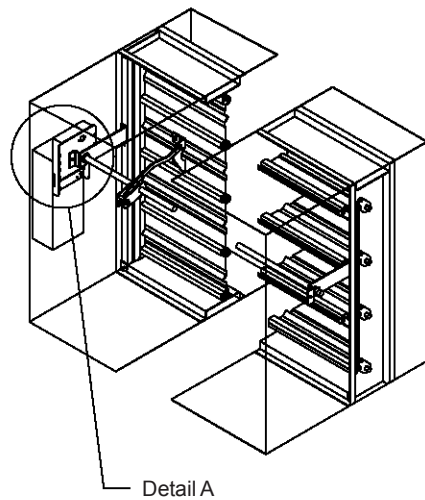
- | | |
|------------------------------------|--------------------------------|
| 1. Position Indication Box (Qty 1) | 2. Self-Drilling Screw (Qty 1) |
|------------------------------------|--------------------------------|
1. Locate extended ½" diameter axle, or extended shaft, on which position indicator is to be mounted.
 2. Slide position indicator box (item 1) onto shaft, allowing shaft to go through the cam. NOTE: If an extended shaft actuator with mounting plate is also placed on this shaft then slide the plate on first and the position indicator box second.
 3. Revolve position indication box around cam to desired position and attach using one self-drilling screw (item 2) through the hole in the flange that is farthest from the cam.
 4. With the damper blades in closed position, rotate the cam and align the untapped hole in can with the notch in the position indication box (Fig. 3)
 5. Tighten the two set screws in the cam, DO NOT OVER-TIGHTEN.
 6. Loosen cover screws and open cover on position indication box to expose connecting wire.

Integral Dual Position Indication (IDPI)

Combination Fire/Smoke Damper

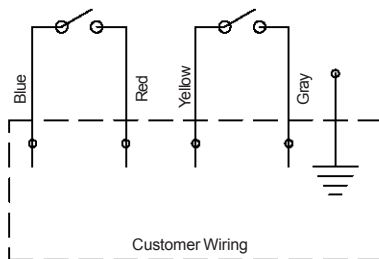
Application

Integral Dual Position Indication (IDPI) provides signal verification that the damper is either in the full open or full close position. These snap action switches make or break a circuit and will not provide proportional resistance. They are intended to be used with smoke and combination fire and smoke dampers, which incorporate 1/2" d-shaped jackshaft only.



Notes

1. All wiring to be done in accordance with N.E.C. (NFPA 70).
2. Switches are rated at 1/3 HP, 125 VAC.
3. Connect incoming ground to the actuator assembly.
4. If the actuator is electrically energized, yet the damper remains in the closed position, check to ensure that the reset button on the heat response device is depressed.
5. A closed circuit results from a relaxed switch button.
6. Actuator location will affect switch functionality. Refer to wiring chart.



Integral Dual Position Indication (IDPI) Wiring Chart			
actuator mounting location	damper full open	damper full close	damper mid-stroke
	closed circuit		
external left	red / blue	yellow / gray	none
external right	yellow / gray	red / blue	none
internal left	yellow / gray	red / blue	none
internal right	red / blue	yellow / gray	none

*This wiring is opposite if the actuator is rotated 90°, so that it is parallel to the duct.

Integral Dual Position Indication (IDPI)

Combination Fire/Smoke Damper

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Combination Fire/Smoke Damper Models: FS, CG, MS, AS, FT, CH, MT, AT, FA, CA, MA, UA, TA, CT, LA

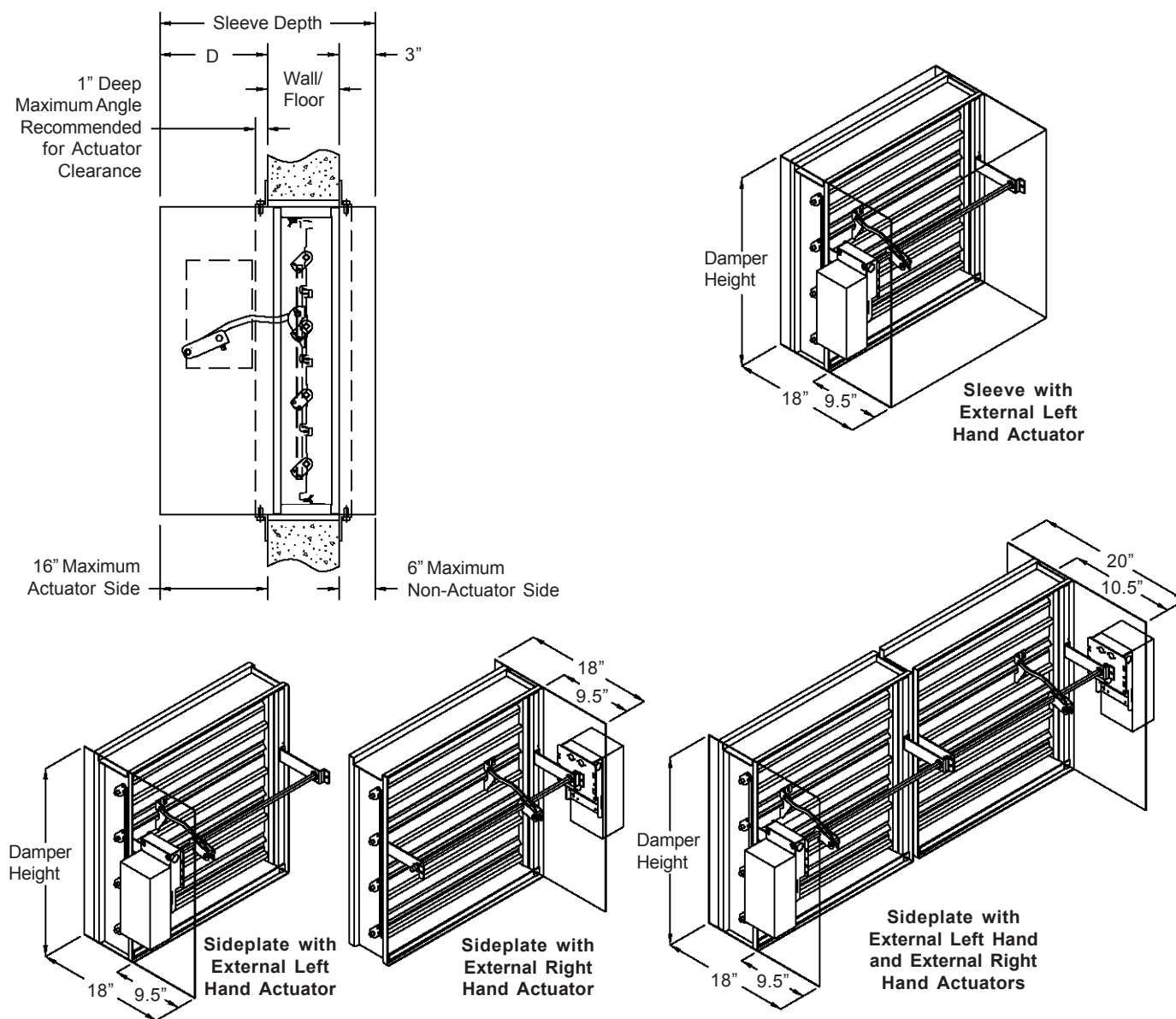
Notes

1. Sleeves are required for the proper installation of fire rated dampers, but need not be factory provided. Reference damper installation instruction for sleeve attachment procedure.
2. Large units that require multiple ship sections will be individually sleeved if sleeve is factory provided.
3. Units with externally mounted actuators require a factory supplied sleeve or sideplate.
4. The standard sleeve is 20-GA x 18" deep (dampers that exceed 84" in width or height require minimum 18-GA sleeve).
5. 10-GA, 12-GA, 14-GA, 16-GA, and 18-GA sleeves are available.
6. Sleeve depths through 48" are available (sleeve distance extending outside of fire barrier must adhere to UL maximums).
7. Refer to Installation Instruction II-FS for sleeve attachment in the field.

Sleeve Depth Determination (for optional mounting in barrier)

The standard sleeve depth allows for an external actuator, 1" retaining angles on both sides of the wall, and 1.5" duct connections on both ends of the sleeve. Sleeve depth and "D" will increase by 1" if a factory-mounted smoke detector is required. A shorter sleeve may be provided and properly installed if internal actuators or one-side retaining angles are utilized, or if the duct connections on one or both ends of the damper are not required. Consult the factory for details.

Standard Sleeve Depth (18") = D (9") + wall/floor thickness (6") + non-actuator side distance (3").



Sleeves & Sideplates

Combination Fire/Smoke Damper Models: FS, CG, MS, AS, FT, CH, MT, AT, FA, CA, MA, UA, TA, CT, LA

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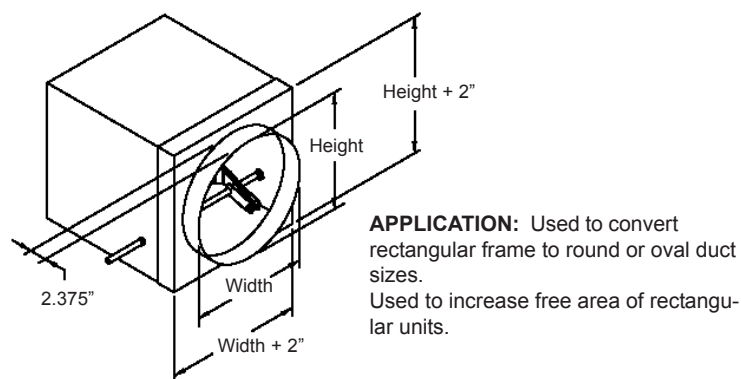
Fire Damper Models: MD19, 15MD, 17MD, MD17, MD39, 30MD, 38MD, 37MD, MA19, 15MA, 17MA, MD17, MA39, 30MA, 38MA, 37MA

Combination Fire/Smoke Damper Models: FR, CR, MR, AR, FS, CG, MS, AS, FT, CH, MT, AT, FA, CA, MA, UA, TA, CT, LA

Smoke Damper Models: SR, SR, KR, UR, S, SG, KH, A, SA, GA, KA, AA

Notes

1. A factory provided sleeve is required for the damper to utilize transitions.
2. Transitions can be provided for vertical or horizontal orientations.
3. Transitions can be provided for one or both ends of the damper (one end only for Front Access and Corridor Dampers).
4. The collar size will be approximately 0.25" smaller than the nominal duct size.

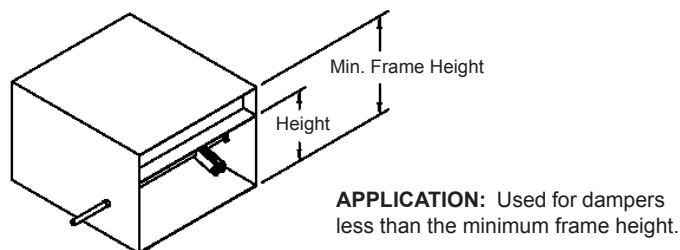


STANDARD MATERIALS AND CONSTRUCTION

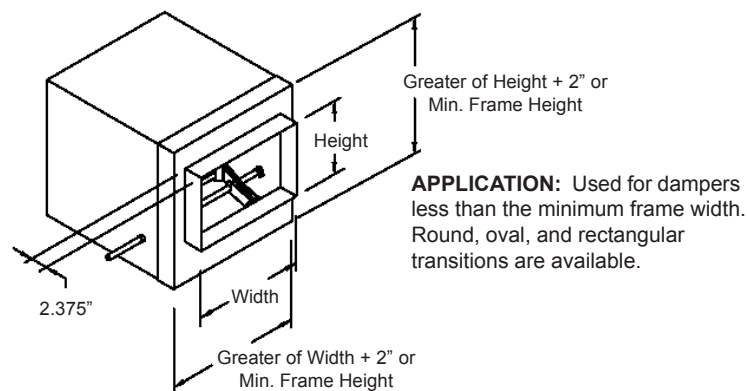
TRANSITION CAP: 20-GA galvanized steel attached to damper sleeve and caulked.

DUCT CONNECTION COLLAR: 24-GA galvanized steel crimped to transition cap and caulked.

*For round duct sizes up to 36" and for oval duct sizes up to 71"W x 30"H, Mestek's 24-GA duct connection collar (crimped to the damper transition) constitutes a UL approved duct-to-sleeve "Breakaway" connection, thus allowing a rigid connection collar and the round or oval ductwork.



B-PAN: 20-GA galvanized steel attached to damper sleeve and caulked at each side.



TRANSITION CAP: 20-GA galvanized steel attached to damper sleeve and caulked.

DUCT CONNECTION COLLAR: 20-GA galvanized steel crimped to transition cap and caulked.

*Requires breakaway duct to collar connection.

Fire Damper Models: MD19, 15MD, 17MD, MD17, MD39, 30MD, 38MD, 37MD, MA19, 15MA, 17MA, MD17, MA39, 30MA, 38MA, 37MA

Combination Fire/Smoke Damper Models: FR, CR, MR, AR, FS, CG, MS, AS, FT, CH, MT, AT, FA, CA, MA, UA, TA, CT, LA

Smoke Damper Models: SR, SR, KR, UR, S, SG, KH, A, SA, GA, KA, AA

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P.O. Box 606
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Web Site: www.airbalance.com

Product Guide Specification

SECTION 15820

COMBINATION FIRE SMOKE DAMPERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Combination fire smoke dampers with blades using triple reinforcement grooves meeting the requirements of the latest edition of UL Standard 555 and UL Standard 555S.

1.2 RELATED SECTIONS

- A. Section 15810 - Ducts.

1.3 REFERENCES

- A. AMCA 500 - Test Methods for Louvers, Dampers and Shutters.
- B. AMCA 511 - Certified Ratings Program for Air Control Devices.
- C. BOCA – Building Officials and Code Administrators.
- D. ICBO – International Conference of Building Officials.
- E. SBCCI – Southern Building Code Congress International.
- F. IBC – International Building Code.
- G. CSFM - California State Fire Marshall Listing for Fire Damper and Smoke Damper.
- H. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- I. NFPA 92A - Smoke-Control Systems.
- J. NFPA 92B – Smoke Control Systems in Atria, Covered Malls, and Large Areas.
- K. NFPA 101 – Life Safety Code.

- L. UL 555 - Standard for Safety; Fire Dampers.
 - M. UL 555S - Standard for Safety; Leakage Rated Dampers for Use in Smoke Control Systems.
- 1.4 SUBMITTALS
- A. Product Data: Submit manufacturer's product data.
 - 1. Include UL ratings, leakage, pressure drop, and maximum pressure data.
 - 2. Indicate materials, construction, dimensions, and installation details.
 - 3. Verify conformance to NFPA, UL, CSFM, and applicable building code.
 - 4. Include damper pressure drop data based on tests and procedures performed in accordance with AMCA 500.
- 1.5 QUALITY ASSURANCE
- A. Dampers shall be warranted against manufacturing defects for a period of 5 years.
 - B. Dampers shall be tested, rated and labeled in accordance with the latest UL requirements.
 - C. Damper pressure drop ratings shall be based on tests and procedures performed in accordance with AMCA 500 and certified by AMCA (if applicable).
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
 - B. Storage: Store materials in a dry area indoor, protected from damage and in accordance with manufacturer's instructions.
 - C. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Air Balance, P.O. Box 606, 7435 Industrial Road, Florence, Kentucky, 41042. Phone (859) 538-3400, Fax (800) 241-9344, Web Site www.airbalance.com

2.2 COMBINATION FIRE SMOKE DAMPERS

- A. Model: FR series combination fire smoke dampers.
- B. Ratings:
 - 1. Fire Resistance: 1-1/2 hours in accordance with UL555.
 - 2. Smoke Rating:

- ☐ FR - Leakage Class II Smoke Damper in accordance with UL555S. A Class II smoke damper leaks no more than 20 cubic feet per minute (.57 m³/min) at 4 in. wg. (1 kPa) differential pressure.
 - ☐ FR - Leakage Class I Smoke Damper in accordance with UL555S. A Class I smoke damper leaks no more than 8 cubic feet per minute (.23 m³/min) at 4 in. wg. (1 kPa.) differential pressure.
3. Elevated Temperature Rating:
 - ☐ 250°F (121°C) in accordance with UL555S.
 - ☐ 350°F (177°C) in accordance with UL555S.
 4. Air Flow Rating: 2000 fpm (10.2 m/s) in accordance with UL555S.
 5. Differential Pressure Rating: 4 in. wg. in accordance with UL555S.
 6. Pressure Drop: Pressure drop for a 12" x 12" (305 mm x 305 mm) unit at a face velocity of 2000 fpm (10.2 m/s) unit shall be no more than 0.164 in. wg. (40.9 Pa).

C. Construction:

1. Frame: Sizes 24" x 24" (610 mm x 610 mm) and smaller shall be constructed with an integral sleeve/frame design and use a single blade through 12" (304 mm) high for maximum free area. One set of perimeter mounting angles shall be factory attached to stiffen the frame design and to supply a fool-proof, user-friendly construction to reduce field installation labor.
2. Blades:
 - a. Style: Single skin with 3 longitudinal grooves.
 - b. Action: Parallel.
 - c. Material: Minimum 18 gage (1.6 mm) galvanized steel.
 - d. Width: Maximum 11 ½" (152 mm).
3. Bearings: Self-lubricating oil impregnated bronze sleeve type, turning in an extruded hole in the damper frame.
4. Seals:
 - a. Blade: Silicone material to maintain smoke leakage rating to a minimum of 350°F (177°C).
 - b. Jamb: Stainless steel, flexible metal compression type.
5. Linkage: On blade.
6. Axles: Plated steel mechanically attached to the blade.

7. Mounting: Vertical and/or Horizontal.
8. Temperature Release Device: Heat-Actuated, Quick Detect.
 - a. Close (in a controlled manner) and lock damper during test, smoke detection, power failure, or fire conditions through actuator closure spring. At no time shall actuator disengage from damper blades.
 - b. Allow damper to be automatically and remotely reset after test or power failure conditions. After exposure to high temperature or fire, inspect damper before reset to ensure proper operation.
 - c. Gradual closing and locking of damper in 7 to 15 seconds to allow duct pressure to equalize. Instantaneous closure is not acceptable.
9. Release Temperature:
 - ☐ 165 degrees F (74 degrees C).
 - ☐ 212 degrees F (100 degrees C).
 - ☐ 250 degrees F (121 degrees C).
 - ☐ 350 degrees F (177 degrees C).
10. Actuator:
 - a. Type:
 - ☐ Electric 120 V, 60 Hz, two-position, fail close.
 - ☐ Electric 24V, 60 Hz, two-position, fail close.
 - ☐ Pneumatic, 20-psi minimum control pressure, two-position, fail close.
 - b. Mounting:
 - ☐ External.

5. Finish: Mill galvanized.

2.3 ACCESSORIES

A. Sens-O-Therm:

1. UL classified dual temperature device allows the damper to be re-opened after initial closure from high heat.
2. Electrically and mechanically locks damper in closed position when duct temperatures exceed 165 degrees F (74 degrees C) or 212 degrees F (100 degrees C).

3. Allow damper to remain operable through a high limit temperature sensor for smoke management purposes while temperature is below 250 degrees F (121 degrees C) or 350 degrees F (177 degrees C).
4. Replaces single heat actuated temperature release devices on standard dampers.
5. Blade position indicator switches: Two position indicator switches directly keyed to jackshaft in order to allow remote indication of damper blade position.

B. Indicator or Auxiliary Switch Package:

- ☐ Switch Package – two-position indicator switches linked directly to damper to remotely indicate damper blade position.

C. Duct Smoke Detector:

1. Model:

- ☐ SM-501-P.
- ☐ 2151 (requires factory supplied remote test station).

2. Mounting:

- ☐ Factory Mounted, unwired (SM-501-P only).
- ☐ Factory Mounted and wired.
- ☐ Shipped Loose for Field Installation.

3. Type:

- ☐ Photoelectronic.

D. Factory Sleeve:

1. 20 gage (1.0 mm) thickness; optional thickness to 16 gage (1.5 mm).
2. Standard sleeve depth is 16 inches (406 mm) long; optional depth to 20 inches (508 mm).
3. Silicone caulk is factory applied to sleeve and damper frame or jamb seal to comply with Class 1 and 2 leakage ratings.

E. Mounting Angles:

- a. 1 ½" x 7/8" x 16 gauge (38 mm x 20 mm x 1.5 mm) galvanized steel perimeter tab lock mounting angles; one set factory mounted.

2.4 SOURCE QUALITY CONTROL

- A. Factory Tests: Factory cycle damper and actuator assembly to assure proper operation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Inspect areas to receive dampers. Notify the Engineer of conditions that would adversely affect the installation or subsequent utilization of the dampers. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install dampers at locations indicated on the drawings and in accordance with manufacturer's UL approved installation instructions.
- B. Install dampers square and free from racking with blades running horizontally.
- C. Do not compress or stretch damper frame into duct or opening.
- D. Handle damper using sleeve or frame. Do not lift damper using blades, actuator, or jackshaft.
- E. FR series smoke dampers are for single panel dampers only.

END OF SECTION

Smoke Dampers

- RS — True Round, Steel Frame, Single Thickness Blade
- SR1 — Class I, Steel Frame, Single Thickness Blade
- SR2 — Class II, Steel Frame, Single Thickness Blade
- S1H — Class I, Steel Frame, Single Thickness Blade
- S1 (SS) — Class I, Stainless Steel Frame, Single Thickness Blade
- S2H — Class II, Steel Frame, Single Thickness Blade
- S2 (SS) — Class II, Stainless Steel Frame, Single Thickness Blade
- SA1 — Class I, Steel Frame, Airfoil Blade
- SA2 — Class II, Steel Frame, Airfoil Blade
- SA2(M)—Class II, Steel Frame, Modulating Control, Airfoil Blade

Supplemental Info — Sleeves & Sideplates
Guide Specifications — SR Series

air balance

Dampers  Louvers
UL Life Safety Products

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MODEL RS

Class I • 250°F or 350°F • Galvanized Steel • True Round Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 20-GA galvanized rolled frame; 18" deep
BLADES: 20-GA double thickness galvanized steel (equal to 14-GA)
AXLES: ½" diameter galvanized or plated steel, full length
BEARING: Oil impregnated bronze sleeve
STOPS: Full open and full closed angle stops
BLADE SEAL: Silicone
CAULKING: UL approved
FINISH: Mill
ACTUATOR: Electric; Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Integral Dual position Indication (IDPI) switches
 Model SM-501 Flow-rated smoke detector; ship loose only
 Model 2151 No-flow smoke detector; ship loose only
 Rolled retaining angles
 Stainless steel bearings
 Copper tubing (for pneumatic actuators)
 Retaining Plates
 Pneumatic Actuators

NOTES

1. Dampers are provided approximately ⅛" undersize.
2. Dampers available in 2" increments only.
3. Dampers ≥ 20" require factory mounted rings in center of damper.

DAMPER SIZES

		2000 fpm, 4 in.wg		3000 fpm, 6 in.wg	
Orientation	Hor & Vert	Hor & Vert	Hor & Vert	Hor & Vert	Hor & Vert
Panels	Minimum Panel	Maximum Panel	Maximum Panel	Maximum Panel	Maximum Panel
RS	6" dia.	24" dia.	24" dia.	24" dia.	24" dia.

UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC SMOKE DAMPER
 LEAKAGE RESISTANCE CLASS I

abi

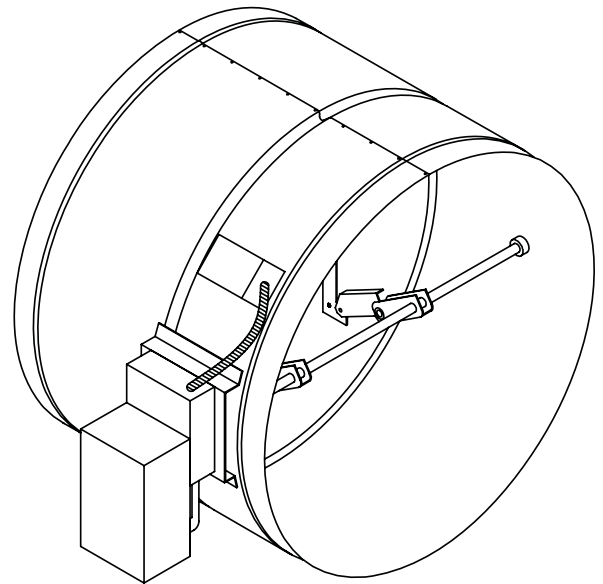
air balance

FILE #R4708



This smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555S
- National Fire Protection Association Standards 80 and 90A
- California State Fire Marshal Listing 3230-1328:124
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be arranged to operate automatically, must fail closed upon loss of power, and must be controlled by a smoke detection system.



air balance

Dampers Louvers
 UL Life Safety Products
 Division of Mastek
 Member of AMCA

MODEL RS

Class I • 250°F or 350°F • Galvanized Steel • True Round Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in.wg (6 in.wg depending on actuator selection)

Maximum Velocity: 2000 fpm (3000 fpm depending on actuator selection)

Leakage Ratings:

UL Class I

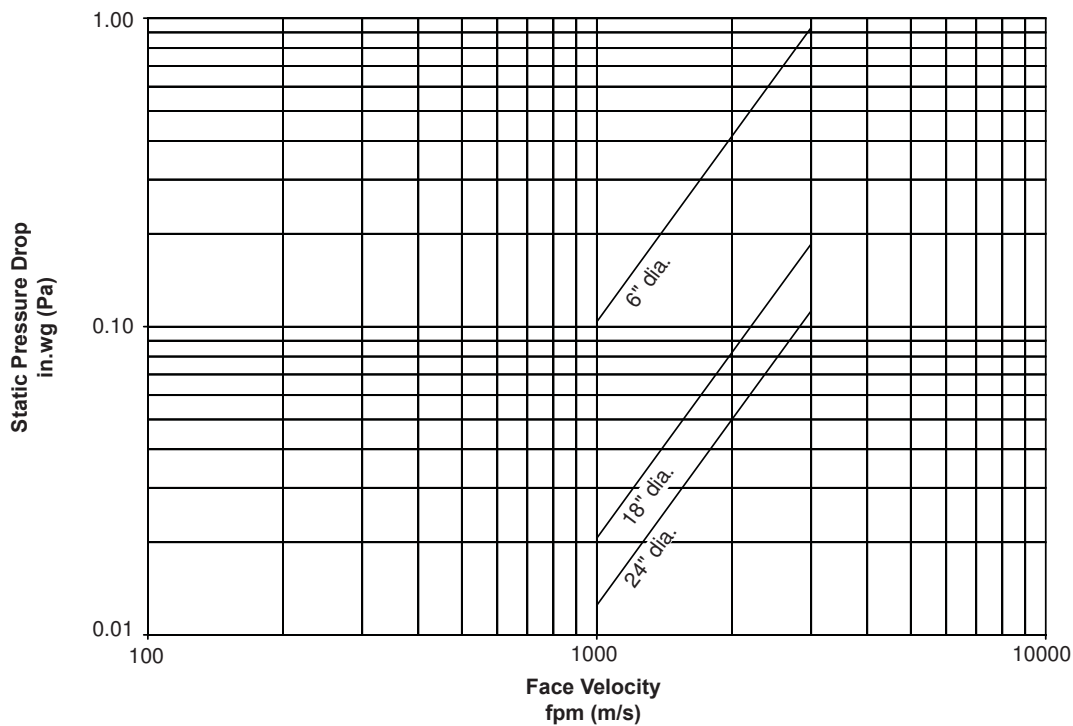
8 cfm per sq. ft. maximum @ 4 in.wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with
AMCA Standard 500D.

AMCA Figure 5.3

air balance

In the interest of product development, Air Balance reserves the right to make changes without notice.

P.O. Box 606 • 7435 Industrial Rd. • Florence, KY 41042 • Phone: (859) 538-3400 • Fax: (859) 647-7810

Dampers • Louvers
UL Life Safety Products
Division of Metek
Member of AMCA

MODEL SR1

Class I • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME:	20-GA galvanized steel flat by 18" long integral sleeve
BLADES:	16-GA galvanized steel single thickness; Parallel action
AXLES:	Plated solid steel stub
BEARINGS:	Oil impregnated bronze
LINKAGE:	Galvanized steel angle interconnect, with plated steel brackets and pivots located on blade
STOPS:	18-GA galvanized steel at head and sill
BLADE SEALS:	Silicone
JAMB SEALS:	Stainless steel
SLEEVE:	Integral 20-GA galvanized steel by 18" long
RETAINING ANGLES:	$\frac{7}{8}$ " x $1\frac{1}{2}$ " x 16-GA adjustable perimeter mounting angle
CAULKING:	Hardcast Irongrip 601 or UL-listed equivalent
FINISH:	Mill on galvanized steel
ACTUATOR:	Electric or pneumatic; Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED DYNAMIC SMOKE DAMPER
LEAKAGE RESISTANCE CLASS I

abi air balance

FILE #R4708



This smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3230-1328:121
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be controlled by a smoke detection system.

OPTIONS

Integral Dual Position Indication (IDPI) switches
Model SM-501 Flow-rated smoke detector shipped loose
Model SM-501 Flow-rated smoke detector mounted and wired (6" minimum damper height with a 20" sleeve - extra 2" on jackshaft side)
Tab-lock retaining angles
Stainless steel bearings
Copper tubing (for pneumatic actuators)
Optional 19" or 20" sleeve depth - Additional sleeve length is added to the non-jackshaft side unless ordered with mounted smoke detector and/or < 6"H with B-Pan Transition
Round or oval transitions
Short-width (<16") and/or short-height (<6") transitions

NOTES

1. "A" width and "B" height are opening dimensions. Damper frames are provided approximately $\frac{1}{4}$ " undersized.
2. Dampers available in 1" increment only.

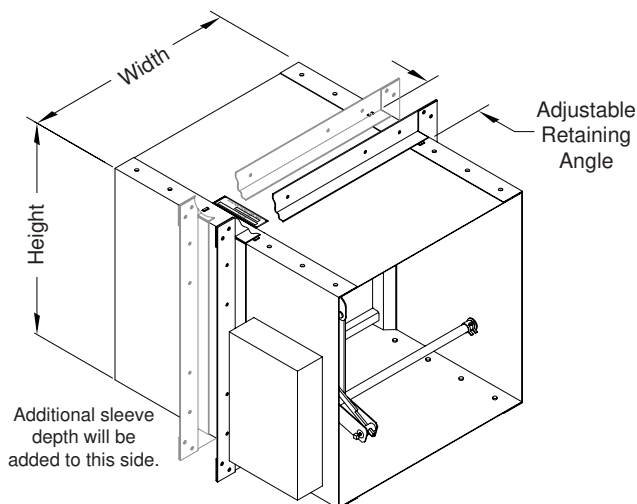
DAMPER SIZES

Orientation	Horizontal & Vertical	
Panels	Minimum Panel	Maximum Panel
Rectangular	4"W x 4"H (16"W x 6"H frame)	24"W x 24"H
Round	4" dia. (16"W x 6"H frame)	22" dia.
Oval	4"W x 4"H (16"W x 6"H frame)	22"W x 22"H

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.
Dampers < 6"H will have a 20" sleeve with the additional sleeve length on the jackshaft side when a B-Pan type transition is ordered.



Blade Profile



MODEL SR1

Class I • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg

Maximum Velocity: 2000 fpm

Leakage Ratings:

UL Class I

8 cfm per sq. ft. maximum @ 4 in. wg

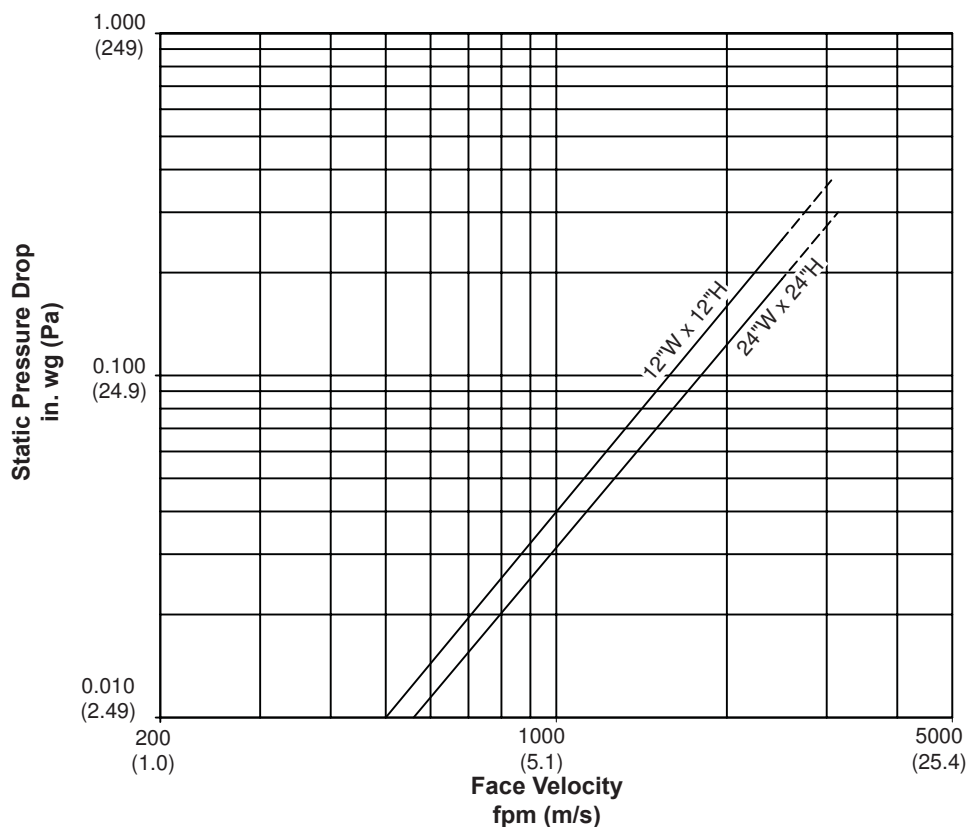
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Noise Criterion (NC)				
Damper	Velocity fpm (m/s)			
Size	1000 (5.08)	2000 (10.16)	3000 (15.24)	4000 (20.32)
12"W x 12"H (305mm x 305mm)	22dB	44dB	55dB	62dB
24"W x 24"H (305mm x 305mm)	30dB	50dB	62dB	not available

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



AMCA Figure 5.3



Air Balance Inc. certifies that the model SR1 damper shown here is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA certified Ratings Program. The AMCA Certified Ratings Seal applies to Air Performance Ratings only.

MODEL SR2

Class II • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

FRAME:	20-GA galvanized steel flat by 18" long integral sleeve
BLADES:	16-GA galvanized steel single thickness; Parallel action
AXLES:	Plated solid steel stub
BEARINGS:	Oil impregnated bronze
LINKAGE:	Galvanized steel angle interconnect, with plated steel brackets and pivots located on blade
STOPS:	18-GA galvanized steel at head and sill
BLADE SEALS:	Silicone
JAMB SEALS:	Stainless steel
SLEEVE:	Integral 20-GA galvanized steel by 18" long
RETAINING ANGLES:	$\frac{7}{8}$ " x $1\frac{1}{2}$ " x 16-GA adjustable perimeter mounting angle
CAULKING:	Hardcast Irongrip 601 or UL-listed equivalent
FINISH:	Mill on galvanized steel
ACTUATOR:	Electric or pneumatic; Factory-installed for Power-Open/Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

UNDERWRITERS LABORATORIES INC.®

CLASSIFIED SMOKE DAMPER
LEAKAGE RESISTANCE CLASS II

abi air balance

FILE #R4708



This smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3230-1328:121
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F or 350°F.
- Actuators must be controlled by a smoke detection system.

OPTIONS

Integral Dual Position Indication (IDPI) switches
Model SM-501 Flow-rated smoke detector shipped loose
Model SM-501 Flow-rated smoke detector mounted and wired (6" minimum damper height with a 20" sleeve - extra 2" on jackshaft side)
Tab-lock retaining angles
Stainless steel bearings
Copper tubing (for pneumatic actuators)
Optional 19" or 20" sleeve depth - Additional sleeve length is added to the non-jackshaft side unless ordered with mounted smoke detector and/or < 6"H with B-Pan Transition
Round or oval transitions
Short-width (<6") and/or short-height (<6") transitions

NOTES

1. "A" width and "B" height are opening dimensions. Damper frames are provided approximately $\frac{1}{4}$ " undersized.
2. Dampers available in 1" increments only.

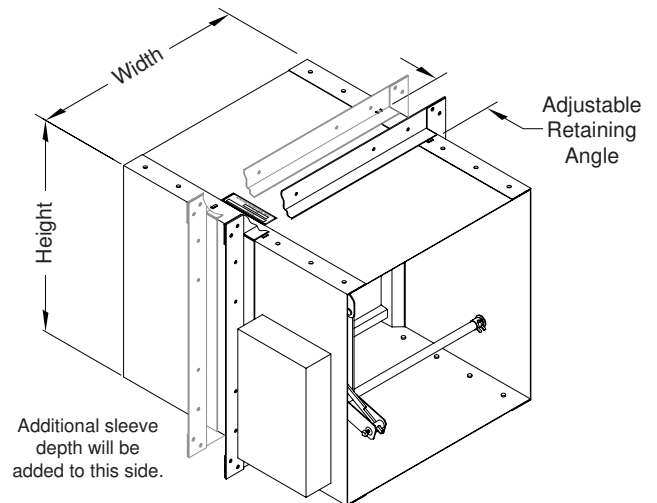
DAMPER SIZES

Orientation	Horizontal & Vertical	
Panels	Minimum Panel	Maximum Panel
Rectangular	4"W x 4"H (6"W x 6"H frame)	24"W x 24"H
Round	4" dia. (6"W x 6"H frame)	22" dia.
Oval	4"W x 4"H (6"W x 6"H frame)	22"W x 22"H

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.
Dampers < 6"H will have a 20" sleeve with the additional sleeve length on the jackshaft side when a B-Pan type transition is ordered.



Blade Profile



MODEL SR2

Class II • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg

Maximum Velocity: 2000 fpm

Leakage Ratings:

UL Class II

20 cfm per sq. ft. maximum @ 4 in. wg

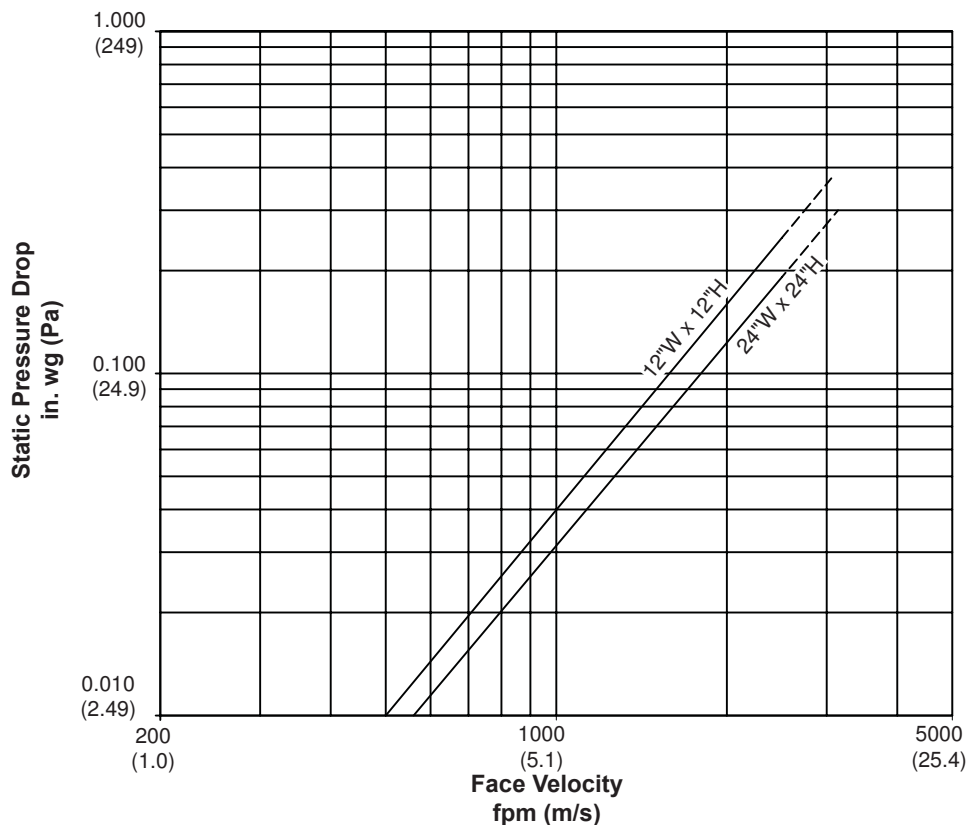
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Noise Criterion (NC)				
Damper	Velocity fpm (m/s)			
Size	1000 (5.08)	2000 (10.16)	3000 (15.24)	4000 (20.32)
12"W x 12"H (305mm x 305mm)	22dB	44dB	55dB	62dB
24"W x 24"H (305mm x 305mm)	30dB	50dB	62dB	not available

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



AMCA Figure 5.3



Air Balance Inc. certifies that the model SR2 damper shown here is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA certified Ratings Program. The AMCA Certified Ratings Seal applies to Air Performance Ratings only.

MODEL S1H

Class I • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7⁄8" x 16-GA galvanized steel hat channel; Flat 16-GA galvanized head and sill for maximum free area on dampers ≤ 13" high
- BLADES:** 16-GA galvanized steel single thickness; Parallel action
- AXLES:** Plated solid steel stub
- BEARINGS:** Oil impregnated bronze
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots, in-jamb type or on-blade type
- STOPS:** 18-GA galvanized steel angles at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA galvanized steel by 18" long (sizes greater than 84" wide or 84" high require minimum 18-GA)
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- ACTUATOR:** Electric or pneumatic; Factory-installed for Power-Open/ Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper
- FINISH:** Mill

OPTIONS

Exact Size (no undercut)

Sleeve - Transition

Actuators - 120V, 24V, 230V or Pneumatic

Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)

Dual Position Indication (IDPI) Switches

Model SM-501 Flow-Rated Smoke Detector.

Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)

Remote Test Box

Copper Tubing (for Pneumatic Actuators)

Transformers

Tab-Lock Retaining Angles - 1 or 2 Sets

Bearings - Stainless Steel

Axle - Stainless Steel

Security Bars

Short-Width (<8") and/or Short-Height (<6") Transitions

NOTES

- "A" width and "B" height are opening dimensions. Dampers are provided approximately ¼" undersize.
- Damper ≥ 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
- Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
- Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
- Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

DAMPER SIZES

		2000 fpm, 4 in.wg				3000 fpm, 4 in.wg	
Orientation	Hor & Vert	Horizontal & Vertical				Horizontal & Vertical	
Panels	** Minimum Panel	Max Panel 250°	Max Panel 350°	Max Assy 250°	Max Assy 350°	Max Panel 250°	Max Assy 250°
Rectangular	4"W x 4"H (8"W x 6"H frame)	36"W x 48"H 48"W x 36"H	36"W x 48"H	144"W x 70"H 288"W x 35"H	128"W x 62"H 256"W x 31"H	36"W x 36"H	108"W x 36"H
Round	4" dia. (8"W x 6"H frame)	34" dia.	34" dia.	68" dia.	60" dia.	34" dia.	n/a
Oval	4"W x 4"H (8"W x 6"H frame)	34"W x 46"H 46"W x 34"H	34"W x 46"H	45 sq.ft. 106"W x 68"H	106"W x 60"H	34"W x 34"H	106"W x 24"H

* Dampers smaller than minimum frame size require a transitions. Reference SD-TRFS.

** For sizes smaller than 16"w x 8"h, airfoil blades will be supplied.

UNDERWRITERS LABORATORIES INC.®
CLASSIFIED DYNAMIC SMOKE DAMPER
LEAKAGE RESISTANCE CLASS I

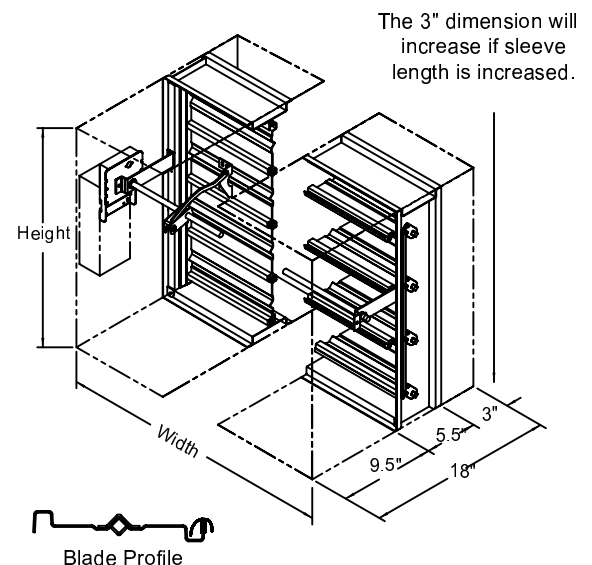
abi air balance

FILE #R4708



This smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3230-1328:106
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be controlled by a smoke detection system.



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UL Life Safety Products
Division of Mestek
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450 Riverside Drive • Wyalusing, PA 18853 • Phone: (570) 746-1888 • Fax: (570) 746-9286

MODEL S1H

Class I • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • Smoke Damper

Operations Rating:

Maximum Differential Pressure: 4 in.wg

Maximum Face Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Rating:

UL Class I

4 cfm per sq.ft. maximum @ 1 in.wg

8 cfm per sq.ft. maximum @ 4 in.wg

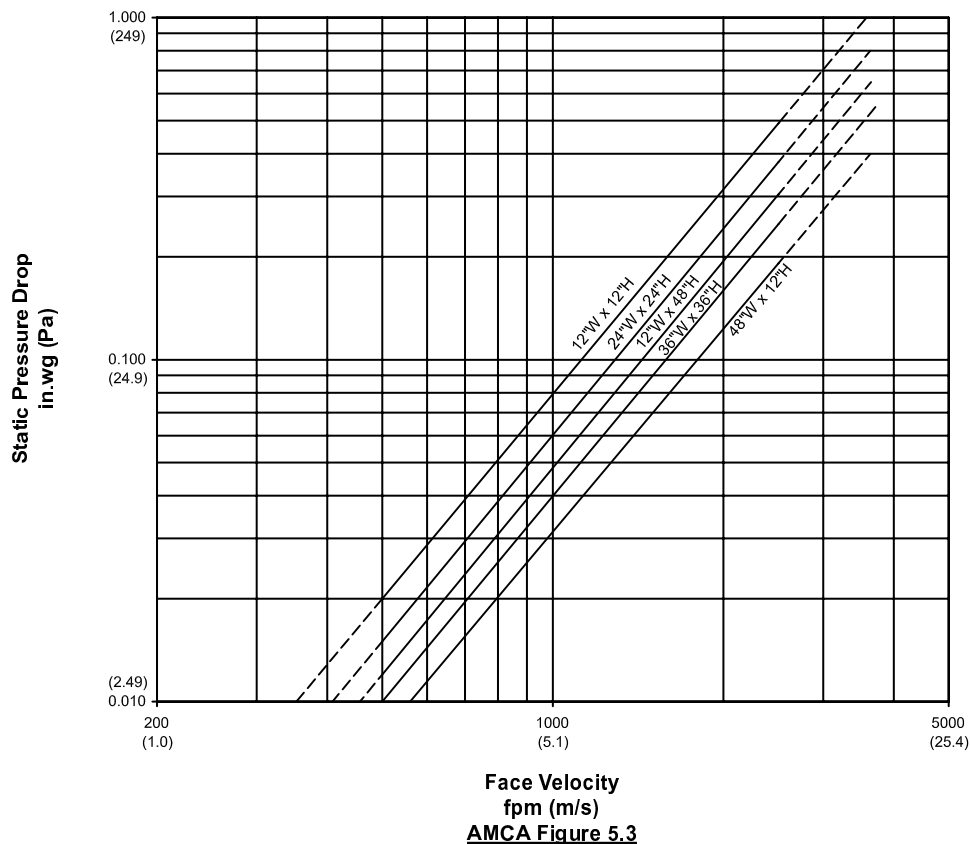
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Damper Size	Noise Criterion (NC)			
	Velocity (fpm)			
	1000	2000	3000	4000
12"W x 12"H	31	53	64	71
24"W x 24"H	33	54	65	n/a

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with AMCA
Standard 500D.

Smoke Damper: Class I • 250°F • Stainless Steel • Single Thickness Blade**STANDARD MATERIALS AND CONSTRUCTION**

FRAME:	5½" x 7⅞" x 16-GA 304 stainless steel hat channel; A flat head and sill are used for sizes thru 13" high
BLADES:	16-GA 304 stainless steel single thickness; Parallel action
AXLES:	Plated solid steel stub
BEARINGS:	304 stainless steel
LINKAGE:	304 stainless steel angle and crank plates with stainless steel pivots; In-jamb type
STOPS:	18-GA 304 stainless steel at head and sill
BLADE SEALS:	Silicone
JAMB SEALS:	Stainless steel
SLEEVE:	Minimum 20-GA stainless steel by 18" long (sizes greater than 84" wide or 84" high require minimum 18-GA)
CAULKING:	Hardcast Irongrip 601 or UL-listed equivalent
FINISH:	Mill on stainless steel
ACTUATOR:	Electric or pneumatic; Factory-installed for Power-Open/ Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Type 316 Stainless Steel (where available)
 External right hand actuator mounting location
 Integral Dual Position Indication (IDPI) switches
 Model SM-501 Flow-rated smoke detector (10" minimum damper height)
 Tab-Lock retaining angles
 Copper tubing (for pneumatic actuators)
 Sleeves of various depths and gauge thicknesses
 Round or oval transitions
 Short-width (<16") and/or short-height (<8") transitions
 Power-Close/Spring-Open actuation (restrictions apply)

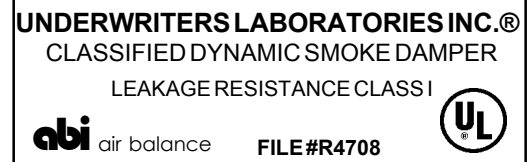
NOTES

1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve will increase the size of the assembly.
2. Damper with smoke detector must have a minimum sleeve of 19" (10.5" on the actuator side and 3" on the non-actuator side).
3. On dampers with all internal actuators, minimum height for factory mounted smoke detectors to be 14".

DAMPER SIZES

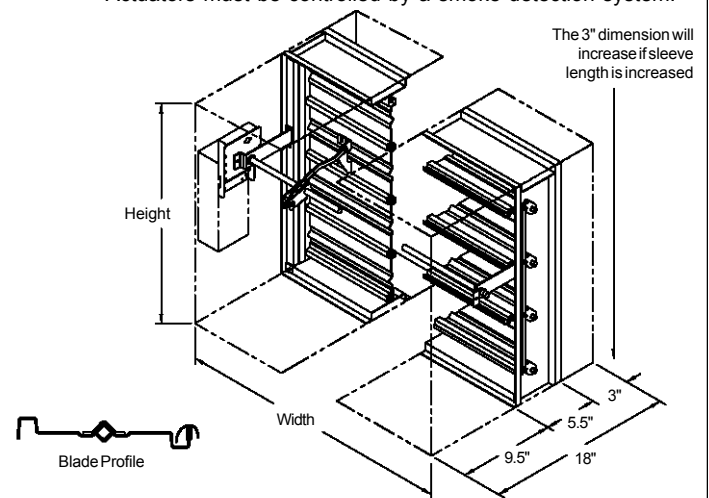
Orientation	2000 fpm 4 in.wg			3000 fpm 4 in.wg	
	Horizontal & Vertical			Horizontal & Vertical	
Panels	Min Panel	Max Panel	Max Assy	Max Panel	Max Assy
Rectangular	4"W x 4"H (16"W x 8"H frame)	36"W x 36"H	108"W x 36"H	36"W x 36"H	108"W x 36"H
Round	4" dia. (16"W x 8"H frame)	34" dia.	not available	34" dia.	not available
Oval	4"W x 4"H (16"W x 8"H frame)	34"W x 34"H	106"W x 34"H	34"W x 34"H	106"W x 34"H

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.



This smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #112-99-M
- California State Fire Marshal Listing #3230-1328:106
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F.
- Actuators must be controlled by a smoke detection system.



Smoke Damper: Class I • 250°F • Stainless Steel • Single Thickness Blade**Operations Ratings:**

Maximum Differential Pressure: 4 in. wg

Maximum Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class I

4 cfm per sq. ft. maximum @ 1 in. wg

8 cfm per sq. ft. maximum @ 4 in. wg

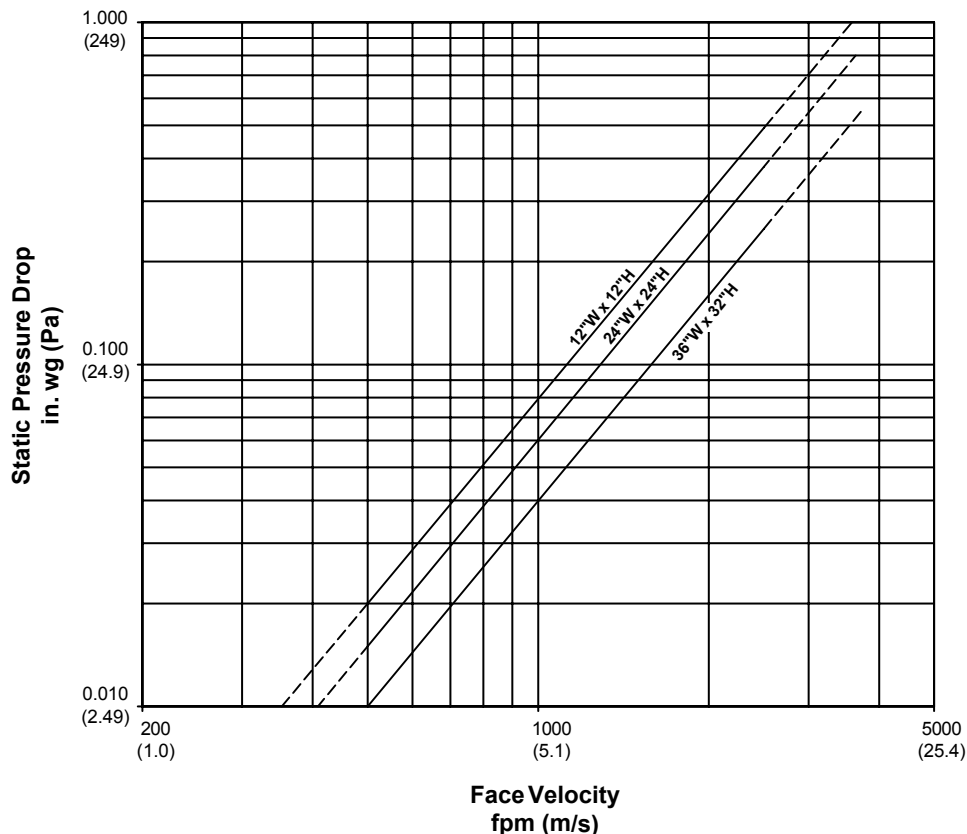
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Noise Criterion (NC)				
Damper	Velocity (fpm)			
Size	1000	2000	3000	4000
12"W x 12"H (305mm x 305mm)	31	53	64	71
24"W x 24"H (610mm x 610mm)	33	54	65	not available

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with
AMCA Standard 500D.

AMCA Figure 5.3

In the interest of product development, Air Balance reserves the right to make changes without notice.

450 Riverside Drive • Wyalusing, PA 18853 • Phone: (570) 746-1888 • Fax: (570) 746-9286

MODEL S2H

Class II • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x ¾" x 16-GA galvanized steel hat channel; Flat 16-GA galvanized head and sill for maximum free area on dampers ≤ 13" high
- BLADES:** 16-GA galvanized steel single thickness; Parallel action
- AXLES:** Plated solid steel stub
- BEARINGS:** Oil impregnated bronze
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots, in-jamb type or on-blade type
- STOPS:** 18-GA galvanized steel angles at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA galvanized steel by 18" long (sizes greater than 84" wide or 84" high require minimum 18-GA)
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- ACTUATOR:** Electric or pneumatic; Factory-installed for Power-Open/ Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper
- FINISH:** Mill

OPTIONS

Exact Size (no undercut)
 Sleeve - Transition
 Actuators - 120V, 24V, 230V or Pneumatic
 Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
 Dual Position Indication (IDPI) Switches
 Model SM-501 Flow-Rated Smoke Detector.
 Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
 Remote Test Box
 Copper Tubing (for Pneumatic Actuators)
 Transformers
 Tab-Lock Retaining Angles - 1 or 2 Sets
 Bearings - Stainless Steel
 Axle - Stainless Steel
 Security Bars
 Short-Width (<8") and/or Short-Height (<8") Transitions

NOTES

- approximately ¼" undersize.
- Damper ≥ 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
- Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
- Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve.
- Dampers for horizontal installation can only be mounted in a fire barrier constructed of masonry/concrete materials.

DAMPER SIZES

		2000 fpm, 4 in.wg				3000 fpm, 4 in.wg	
Orientation	H or & Vert	Horizontal & Vertical				Horizontal & Vertical	
Panels	M inimum Panel	Max Panel 250°	Max Panel 350°	Max Assy 250°	Max Assy 350°	Max Panel 250°	Max Assy 250°
Rectangular	4"W x 4"H (8"W x 8"H frame)	36"W x 48"H 48"W x 36"H	36"W x 48"H	144"W x 70"H 288"W x 35"H	128"W x 62"H 256"W x 31"H	36"W x 36"H	108"W x 36"H
Round	4" dia. (8"W x 8"H frame)	34" dia.	34" dia.	68" dia.	60" dia.	34" dia.	/a
Oval	4"W x 4"H (8"W x 8"H frame)	34"W x 46"H 46"W x 34"H	34"W x 46"H	45 sq.ft. 106"W x 68"H	106"W x 60"H	34"W x 34"H	106"W x 24"H

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.

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UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC SMOKE DAMPER
 LEAKAGE RESISTANCE CLASS II

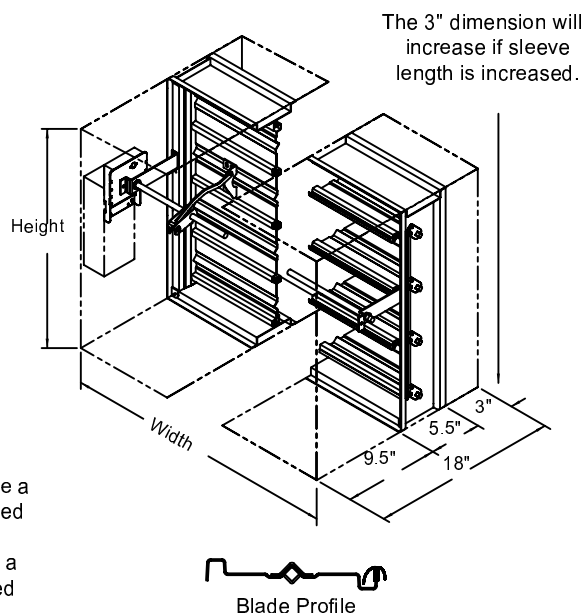
abi air balance

FILE #R4708



This smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- California State Fire Marshal Listing #3230-1328:106
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F or 350°F.
- Actuators must be controlled by a smoke detection system.



MODEL S2H

Class II • 250°F or 350°F • Galvanized Steel • Single Thickness Blade • Smoke Damper

Operations Rating:

Maximum Differential Pressure: 4 in.wg

Maximum Face Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Rating:

UL Class II

10 cfm per sq.ft. maximum @ 1 in.wg

20 cfm per sq.ft. maximum @ 4 in.wg

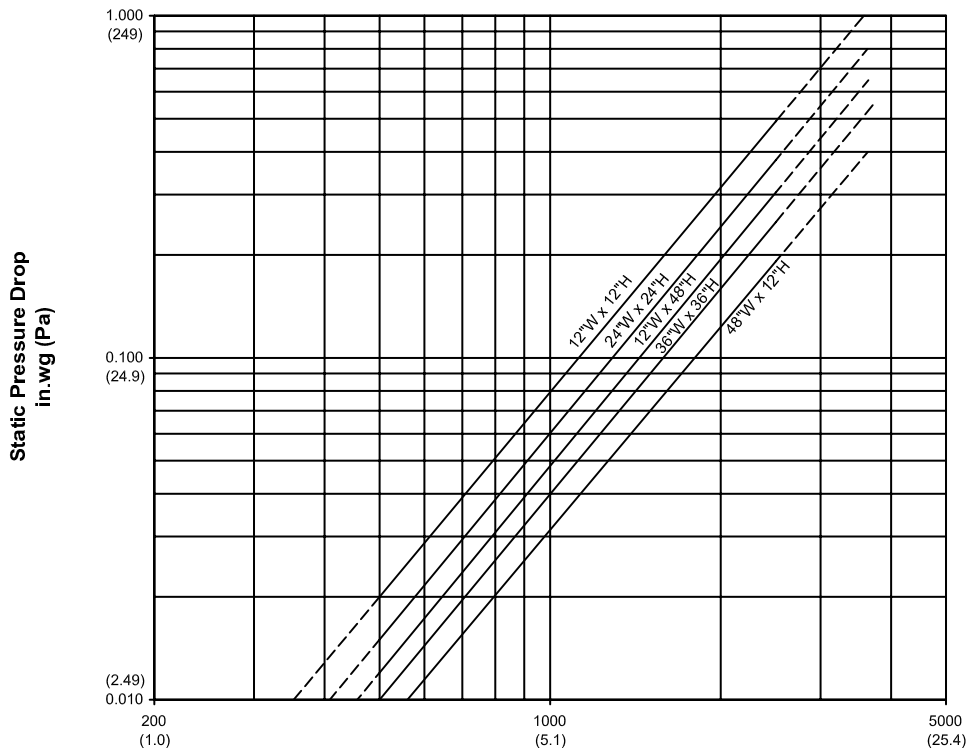
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Damper Size	Noise Criterion (NC)			
	Velocity (fpm)			
	1000	2000	3000	4000
12"W x 12"H	31	53	64	71
24"W x 24"H	33	54	65	n/a

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



Face Velocity
fpm (m/s)
AMCA Figure 5.3

This product was tested
in accordance with AMCA
Standard 500D.

Smoke Damper: Class II • 250°F • Stainless Steel • Single Thickness Blade**STANDARD MATERIALS AND CONSTRUCTION**

FRAME:	5½" x 7⅞" x 16-GA 304 stainless steel hat channel; A flat head and sill are used for sizes thru 13" high
BLADES:	16-GA 304 stainless steel single thickness; Parallel action
AXLES:	Plated solid steel stub
BEARINGS:	304 stainless steel
LINKAGE:	304 stainless steel angle and crank plates with stainless steel pivots; In-jamb type
STOPS:	18-GA 304 stainless steel at head and sill
BLADE SEALS:	Silicone
JAMB SEALS:	Stainless steel
SLEEVE:	Minimum 20-GA stainless steel by 18" long (sizes greater than 84" wide or 84" high require minimum 18-GA)
CAULKING:	Hardcast Irongrip 601 or UL-listed equivalent
FINISH:	Mill on stainless steel
ACTUATOR:	Electric or pneumatic; Factory-installed for Power-Open/ Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Type 316 Stainless Steel (where available)
 External right hand actuator mounting location
 Integral Dual Position Indication (IDPI) switches
 Model SM-501 Flow-rated smoke detector (10" minimum damper height)
 Tab-Lock retaining angles
 Copper tubing (for pneumatic actuators)
 Sleeves of various depths and gauge thicknesses
 Round or oval transitions
 Short-width (<8") and/or short-height (<8") transitions
 Power-Close/Spring-Open actuation (restrictions apply)

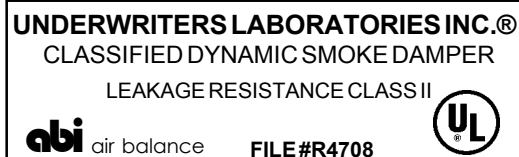
NOTES

1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve will increase the size of the assembly.
2. Damper with smoke detector must have a minimum sleeve of 19" (10.5" on the actuator side and 3" on the non-actuator side).
3. On dampers with all internal actuators, minimum height for factory mounted smoke detectors to be 14".

DAMPER SIZES

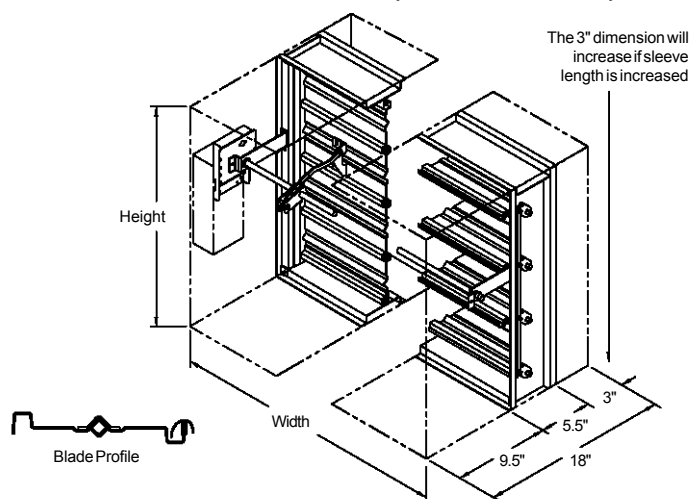
Orientation	2000 fpm 4 in.wg			3000 fpm 4 in.wg	
	Horizontal & Vertical			Horizontal & Vertical	
Panels	Min Panel	Max Panel	Max Assy	Max Panel	Max Assy
Rectangular	4"W x 4"H (8"W x 8"H frame)	36"W x 36"H	108"W x 36"H	36"W x 36"H	108"W x 36"H
Round	4" dia. (8"W x 8"H frame)	34" dia.	not available	34" dia.	not available
Oval	4"W x 4"H (8"W x 8"H frame)	34"W x 34"H	106"W x 34"H	34"W x 34"H	106"W x 34"H

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.



This smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standard 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #112-99-M
- California State Fire Marshal Listing #3230-1328:106
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F.
- Actuators must be controlled by a smoke detection system.



Smoke Damper: Class II • 250°F • Stainless Steel • Single Thickness Blade**Operations Ratings:**

Maximum Differential Pressure: 4 in. wg

Maximum Velocity: 2000 fpm (3000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class II

10 cfm per sq. ft. maximum @ 1 in. wg

20 cfm per sq. ft. maximum @ 4 in. wg

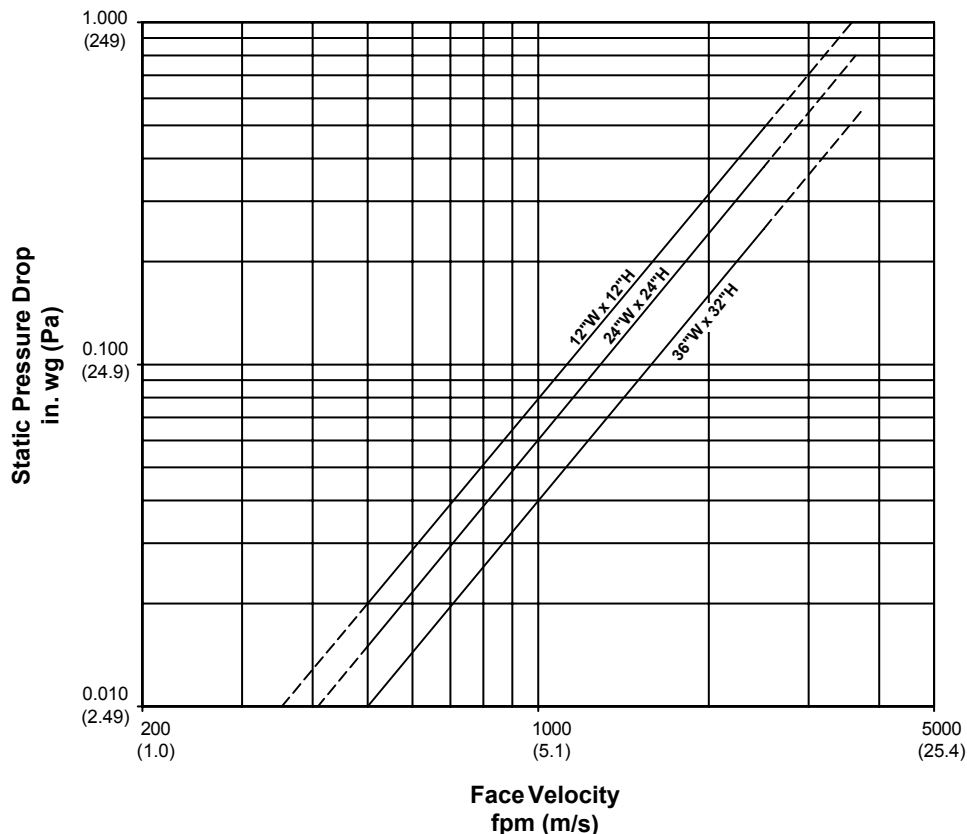
Sound Ratings:

The Noise Criterion data below was tested in accordance with ASTM E477.99 in the center octave band.

Noise Criterion (NC)				
Damper	Velocity (fpm)			
Size	1000	2000	3000	4000
12"W x 12"H (305mm x 305mm)	31	53	64	71
24"W x 24"H (610mm x 610mm)	33	54	65	not available

Pressure Drop Ratings:

The pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.



This product was tested
in accordance with
AMCA Standard 500D.

AMCA Figure 5.3

In the interest of product development, Air Balance reserves the right to make changes without notice.

450 Riverside Drive • Wyalusing, Pa 18853 • Phone: (570) 746-1888 • Fax: (570) 746-9286

Leakage Class I • Airfoil Blade • 250°F or 350°F • Galvanized Steel • Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x 7/8" x 16-GA galvanized steel hat channel; A flat head and sill are used for sizes thru 13" high
- BLADES:** 20-GA galvanized steel double skinned (equal to 14-GA); Parallel action
- AXLES:** Plated solid steel stub
- BEARINGS:** Oil impregnated bronze
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots; In-jamb type
- STOPS:** 18-GA galvanized steel at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA galvanized steel by 18" long (sizes greater than 84" wide or 84" high require minimum 18-GA)
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- FINISH:** Mill on galvanized steel
- ACTUATOR:** Electric or pneumatic; Factory-installed for Power-Open/ Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Exact Size (no undercut)
 Flange - Front, Rear or Both
 Actuators - 120V, 24V, 230V, Pneumatic
 Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
 Dual Position Indication (IDPI) Switches
 Model SM-501 Flow-Rated Smoke Detector
 Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
 Remote Test Box
 Momentary Test Switch
 Transformers
 Tab-Lock Retaining Angles - 1 or 2 sets
 Stainless Steel Bearings
 Stainless Steel Axles
 Copper Tubing (pneumatic actuator)
 Sleeves of Various Depths and Gauge Thicknesses (restrictions apply)
 No Sleeve or Sideplate (restrictions apply)
 Round or Oval Transitions
 Security Bars
 Short-Width (<8") and/or Short-Height (<6") Transitions

NOTES

1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve will increase the size of the assembly.
2. Dampers >= 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on actuator side); detectors will be mounted on side of damper opposite actuator.
3. Damper <12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on actuator side) and detectors will be mounted on bottom (or top) of damper.
4. Smoke detectors can be ordered for field mounting with standard 18" deep sleeves.

DAMPER SIZES

** 2000 fpm, 4 in. w.g.			
Orientation	Horizontal & Vertical		
Panels	Min. Panel	Max. Panel	Max. Assy
Rectangular	4"W x 4"H (8"W x 6"H frame)	36"W x 48"H	144"W x 96"H or 288"W x 48"H
Round	4" dia. (8"W x 6"H frame)	34" dia.	60" dia.
Oval	4"W x 4"H (8"W x 6"H frame)	34"W x 46"H	106"W x 60"H

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.

** See Addendum on page 3 for additional ratings.

UNDERWRITERS LABORATORIES INC.®
 CLASSIFIED DYNAMIC SMOKE DAMPER
 LEAKAGE RESISTANCE CLASS I

abi

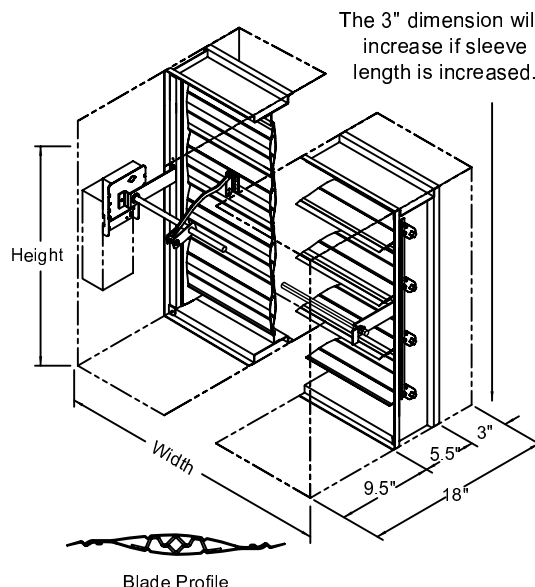
air balance

FILE #R4708



This smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #112-99-M
- California State Fire Marshal Listing #3230-1328:111
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class I and 250°F or 350°F.
- Actuators must be controlled by a smoke detection system.



Leakage Class I • Airfoil Blade • 250°F or 350°F • Galvanized Steel • Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg (6 in. wg for selected size/actuator combinations)

Maximum Velocity: 2000 fpm (4000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class I

4 cfm per sq. ft. maximum @ 1 in. wg

8 cfm per sq. ft. maximum @ 4 in. wg

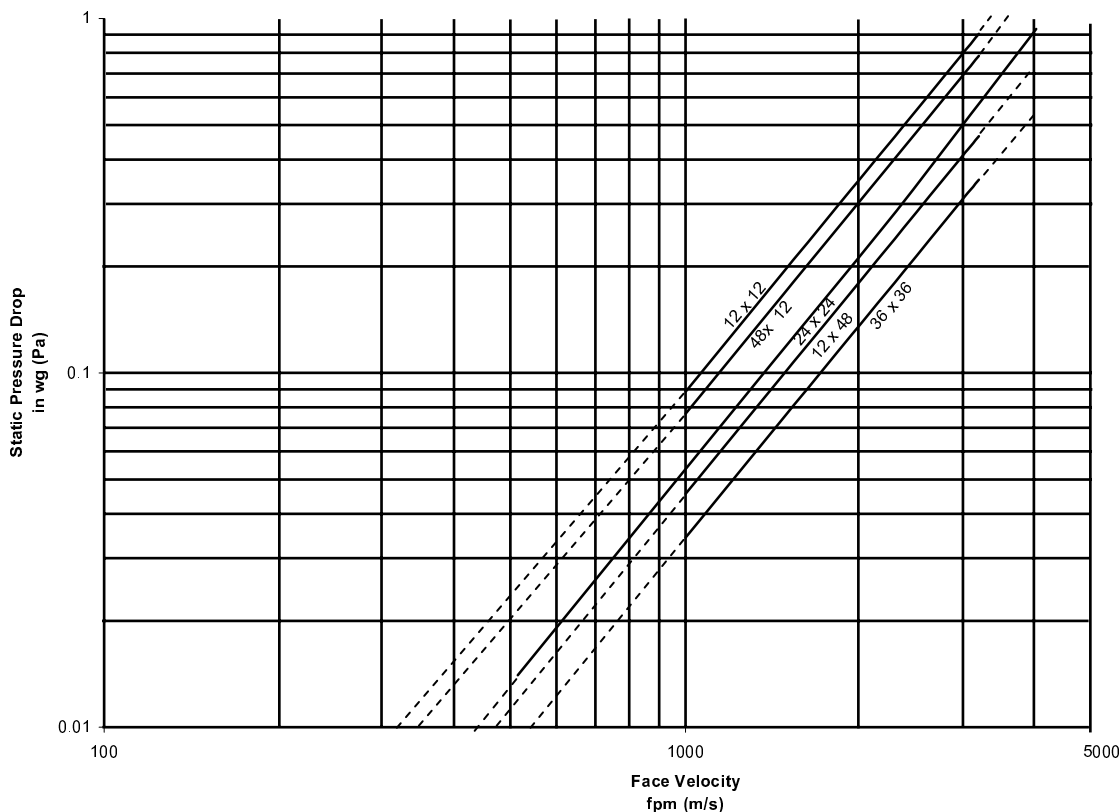
9.8 cfm per sq. ft. maximum @ 6 in. wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The Pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.

SA Pressure Drop**AMCA FIGURE 5.3**

Air Balance certifies that the model SA1 damper shown here is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Air Performance Ratings only.

ADDENDUM SD-SA1-13-08

Extended Pressure & Velocity Ratings

SA1 Extended Pressure & Velocity Ratings

Damper Style	Temp Rating (°F)	Velocity & Pressure	Horizontal & Vertical Min Panel	Horizontal & Vertical Max Panel	Horizontal & Vertical Max Assy
No Transition	250° - or - 350°	2000 fpm, 4" w.g.	8" x 6" frame	36" x 48" frame	144" x 96" frame - or - 288" x 48" frame
		3000 fpm, 4" w.g.		24" x 36" frame - or - 36" x 24" frame	96" x 72" frame
		4000 fpm, 4" w.g.		24" x 36" frame - or - 36" x 24" frame	96" x 36" frame - or - 108" x 24" frame
		4000 fpm, 6" w.g. (external act only for 350°)		16" x 24" frame	n/a
C-Round - or - C-Square	250° - or - 350°	2000 fpm, 4" w.g.	4" dia. duct - or - 4" x 4" duct (8" x 6" frame)	34" dia. duct - or - 34" x 34" duct	81" dia. duct - or - 81" x 81" duct
		3000 fpm, 4" w.g.		22" dia. duct - or - 22" x 22" duct	70" dia. duct - or - 70" x 70" duct
		4000 fpm, 4" w.g.		22" dia. duct - or - 22" x 22" duct	34" dia. duct - or - 34" x 34" duct
		4000 fpm, 6" w.g. (external act only for 350°)		14" dia. duct - or - 14" x 14" duct	n/a
C-Oval - or - C-Rectangle	250° - or - 350°	2000 fpm, 4" w.g.	4" x 4" duct (8" x 6" frame)	34" x 46" duct	70" x 94" duct - or - 94" x 70" duct
		3000 fpm, 4" w.g.		22" x 34" duct - or - 34" x 22" duct	94" x 70" duct
		4000 fpm, 4" w.g.		22" x 34" duct - or - 34" x 22" duct	94" x 34" duct - or - 106" x 22" duct
		4000 fpm, 6" w.g. (external act only for 350°)		14" x 22" duct	n/a

*all dimensions are shown as width x height
for **NO TRANSITION**, order size = frame size = duct size
unless otherwise noted, duct size = order size*

WITH TRANSITIONS, damper **frame** size = order width + 2" x order height + 2"

Leakage Class II • Airfoil Blade • 250°F or 350°F • Smoke Damper

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x ¾" x 16-GA galvanized steel hat channel; A flat head and sill are used for sizes thru 13" high
- BLADES:** 20-GA galvanized steel double skinned (equal to 14-GA); Parallel action
- AXLES:** Plated solid steel stub
- BEARINGS:** Oil impregnated bronze
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots; In-jamb type
- STOPS:** 18-GA galvanized steel at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA galvanized steel by 18" long (sizes greater than 84" wide or 84" high require minimum 18-GA)
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- FINISH:** Mill on galvanized steel
- ACTUATOR:** Electric or pneumatic; Factory-installed for Power-Open/ Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Exact Size (no undercut)
 Flange - Front, Rear or Both
 Actuators - 120V, 24V, 230V, Pneumatic
 Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)
 Dual Position Indication (IDPI) Switches
 Model SM-501 Flow-Rated Smoke Detector
 Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)
 Remote Test Box
 Momentary Test Switch
 Transformers
 Tab-Lock Retaining Angles - 1 or 2 sets
 Stainless Steel Bearings
 Stainless Steel Axles
 Copper Tubing (pneumatic actuator)
 Sleeves of Various Depths and Gauge Thicknesses (restrictions apply)
 No Sleeve or Sideplate (restrictions apply)
 Round or Oval Transitions
 Security Bars
 Short-Width (<8") and/or Short-Height (<6") Transitions

NOTES

1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve will increase the size of the assembly.
2. Dampers >= 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on actuator side); detectors will be mounted on side of damper opposite actuator.
3. Damper <12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on actuator side) and detectors will be mounted on bottom (or top) of damper.
4. Smoke detectors can be ordered for field mounting with standard 18" deep sleeves.

UNDERWRITERS LABORATORIES INC.®
CLASSIFIED DYNAMIC SMOKE DAMPER
LEAKAGE RESISTANCE CLASS II

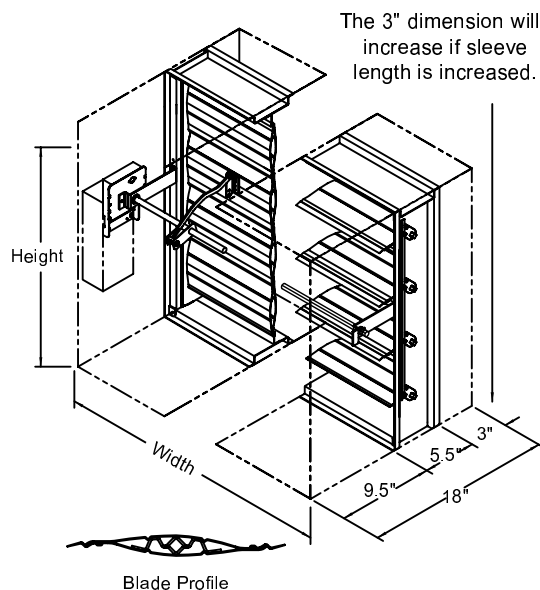
abi air balance

FILE #R4708



This smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #112-99-M
- California State Fire Marshal Listing #3230-1328:111
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F or 350°F.
- Actuators must be controlled by a smoke detection system.



DAMPER SIZES		2000 fpm, 4 in.wg		** 4000 fpm, 6 in.wg, 250°F Only	
Orientation	Hor & Vert	Horizontal & Vertical		Horizontal & Vertical	
Panel	Min Panel	Max Panel	Max Assy	Max Panel	Max Assy
Rectangular	4"W x 4"H (8"W x 6"H frame)	36"W x 48"H	144"W x 96"H 288"W x 48"H	24"W x 24"H	96"W x 24"H
Round	4" dia. (8"W x 6"H frame)	34" dia.	81" dia.	22" dia.	n/a
Oval	4"W x 4"H (8"W x 6"H frame)	34"W x 46"H	70" x 94" 94" x 70"	22"W x 22"H	94"W x 22"H

*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.

** See Addendum for additional ratings.

MODEL SA2

Leakage Class II • Airfoil Blade • 250°F or 350°F • Smoke Damper

Operations Ratings:

Maximum Differential Pressure: 4 in. wg (6 in. wg for selected size/actuator combinations)
Maximum Velocity: 2000 fpm (4000 fpm for selected size/actuator combinations)

Leakage Ratings:

UL Class II
10 cfm per sq. ft. maximum @ 1 in. wg
20 cfm per sq. ft. maximum @ 4 in. wg
24.5 cfm per sq. ft. maximum @ 6 in. wg

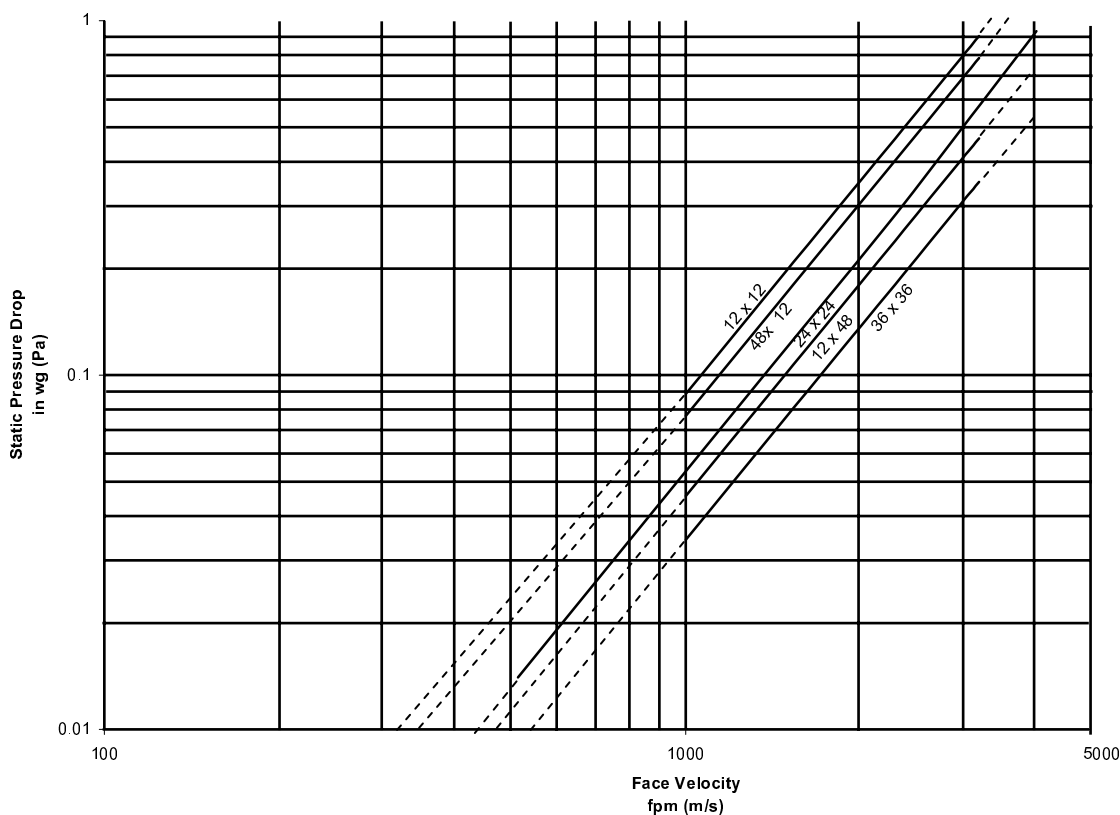
Sound Ratings:

None Available

Pressure Drop Ratings:

The Pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.

SA Pressure Drop



AMCA FIGURE 5.3



Air Balance certifies that the model SA2 damper shown here is licensed to bear the AMCA seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA Certified Ratings Seal applies to Air Performance Ratings only.

Leakage Class II • Airfoil Blade • 250°F or 350°F • Smoke Damper

ADDENDUM SD-SA2-13-08

Extended Pressure & Velocity Ratings

Damper Style	Temp Rating (°F)	Velocity & Pressure	Horizontal & Vertical Min Panel	Horizontal & Vertical Max Panel	
No Transition	250° - or - 350°	2000 fpm, 4" w.g.	8" x 6" frame	36" x 48" frame	144" x 96" frame - or - 288" x 48" frame
		3000 fpm, 4" w.g.		24" x 36" frame - or - 36" x 24" frame	96" x 72" frame
		4000 fpm, 4" w.g.		24" x 36" frame - or - 36" x 24" frame	96" x 36" frame - or - 108" x 24" frame
	250°	4000 fpm, 6" w.g.		24" x 24" frame	96" x 24" frame
	350°	4000 fpm, 6" w.g. (external act only for 350°)		16" x 24" frame	n/a
C-Round - or - C-Square	250° - or - 350°	2000 fpm, 4" w.g.	4" dia. duct - or - 4" x 4" duct (8" x 6" frame)	34" dia. duct - or - 34" x 34" duct	81" dia. duct - or - 81" x 81" duct
		3000 fpm, 4" w.g.		22" dia. duct - or - 22" x 22" duct	70" dia. duct - or - 70" x 70" duct
		4000 fpm, 4" w.g.		22" dia. duct - or - 22" x 22" duct	34" dia. duct - or - 34" x 34" duct
	250°	4000 fpm, 6" w.g.		22" dia. duct - or - 22" x 22" duct	
	350°	4000 fpm, 6" w.g. (external act only for 350°)		14" dia. duct - or - 14" x 14" duct	n/a
C-Oval - or - C-Rectangle	250° - or - 350°	2000 fpm, 4" w.g.	4" x 4" duct (8" x 6" frame)	34" x 46" duct	70" x 94" duct - or - 94" x 70" duct
		3000 fpm, 4" w.g.		22" x 34" duct - or - 34" x 22" duct	94" x 70" duct
		4000 fpm, 4" w.g.		22" x 34" duct - or - 34" x 22" duct	94" x 34" duct - or - 106" x 22" duct
	250°	4000 fpm, 6" w.g.		22" x 22" duct	94" x 22" duct
	350°	4000 fpm, 6" w.g. (external act only for 350°)		14" x 22" duct	n/a

all dimension are shown as width x height
for **NO TRANSITION**, order size = frame size = duct size

unless otherwise noted, duct size = order size

WITH TRANSITIONS, damper **frame** size = order width + 2" x order height + 2

MODEL SA2M (Modulating)

Leakage Class II • Airfoil Blade • 250°F • Smoke Damper
For Volume Control Applications

STANDARD MATERIALS AND CONSTRUCTION

- FRAME:** 5½" x ⅞" x 16-GA galvanized steel hat channel; A flat head and sill are used for sizes thru 13" high
- BLADES:** 20-GA galvanized steel double skinned (equal to 14-GA); Parallel action
- AXLES:** Plated solid steel stub
- BEARINGS:** Oil impregnated bronze
- LINKAGE:** Plated steel angle and crank plates with stainless steel pivots; In-jamb type
- STOPS:** 18-GA galvanized steel at head and sill
- BLADE SEALS:** Silicone
- JAMB SEALS:** Stainless steel
- SLEEVE:** Minimum 20-GA galvanized steel by 18" long
- CAULKING:** Hardcast Irongrip 601 or UL-listed equivalent
- FINISH:** Mill on galvanized steel
- ACTUATOR:** 24VAC/DC Electric; Factory-installed for Power-Open/ Spring-Close (fail close) operation; External left hand mounted as viewed from jackshaft side of damper

OPTIONS

Exact Size (no undercut)

Flange - Front, Rear or Both

Right Hand and/or Internal Actuator Mounting Locations (Restrictions Apply)

Dual Position Indication (IDPI) Switches

Model SM-501 Flow-Rated Smoke Detector

Model 2151 No-Flow Smoke Detector (12" Minimum Damper Height)

Remote Test Box

Momentary Test Switch

Transformers

Tab-Lock Retaining Angles - 1 or 2 sets

Stainless Steel Bearings

Stainless Steel Axles

Security Bars

Sleeves of Various Depths and Gauge Thickness (restrictions apply)

No Sleeves or Side Plates Only (restrictions apply)

Round or Oval Transitions

Short-Width (<8") and/or Short-Height (<6") Transitions

NOTES

1. Damper frames are provided approximately ¼" undersized. The addition of a sleeve will increase the size of the assembly.
2. Damper ≥ 12" in height with factory mounted SM-501 smoke detectors require a minimum 19" deep sleeve (10.5" on the actuator side); detectors will be mounted on the side of the damper opposite actuator.
3. Damper < 12" in height with factory mounted SM-501 smoke detectors require a minimum 20" deep sleeve (11.5" on the actuator side); detectors will be mounted on the bottom or top of damper.
4. Smoke Detectors can be ordered for field mounting with standard 18" deep sleeve
5. Actuator control signal is 2-10 VDC or with addition of 500 ohm resistor (by others) is 4-20 mA.

DAMPER SIZES

Damper Style	Temp Rating (°F)	Velocity & Pressure	Horizontal & Vertical Min Panel	Horizontal & Vertical Max Panel	Horizontal & Vertical Max Assy
No Transition	250°	2000 fpm, 4" w.g.	8" x 6" frame	24" x 24" frame	96" x 48" frame
C-Round - or - C-Square			4" dia. duct - or - 4" x 4" duct (8" x 6" frame)	22" dia. duct - or - 22" x 22" duct	46" dia. duct - or - 46" x 46" duct
C-Oval - or - C-Rectangle			4" x 4" duct (8" x 6" frame)	22" x 22" duct	94" x 46" duct

UNDERWRITERS LABORATORIES INC.®
CLASSIFIED DYNAMIC SMOKE DAMPER
LEAKAGE RESISTANCE CLASS II

abi

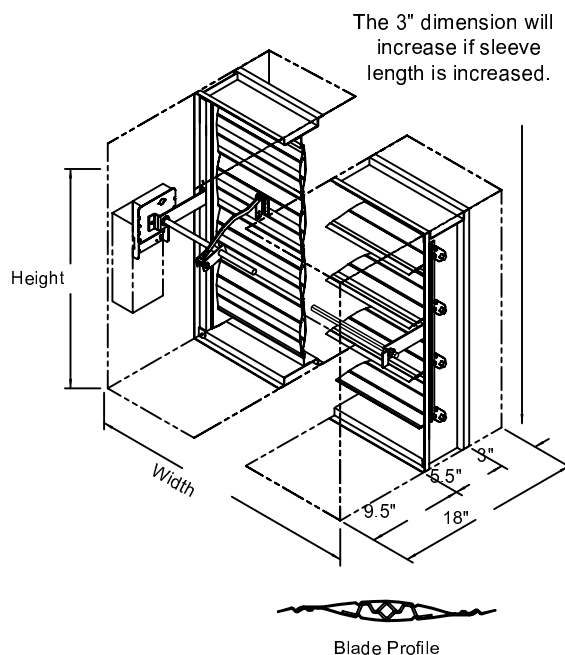
air balance

FILE #R4708



This smoke damper meets the construction and performance requirements of:

- Underwriters Laboratories Inc. Standards 555S
- National Fire Protection Association Standards 80 and 90A
- ICC's International Building Code
- New York City MEA Listing #112-99-M
- California State Fire Marshal Listing #3230-1328:111
- Underwriters Laboratories Inc. Approved for dual direction airflow and dynamic conditions.
- Underwriters Laboratories Inc. Classified for use in smoke control systems for Leakage Class II and 250°F.
- Actuators must be controlled by a smoke detection system.



Blade Profile

all dimensions are shown as width x height
for **NO TRANSITION**, order size = frame size = duct size
unless otherwise noted, duct size = order size

WITH TRANSITIONS, damper **frame** size = order width + 2" x order height + 2"
*Dampers smaller than minimum frame size require a transition. Reference SD-TRFS.

MODEL SA2M (Modulating)

Leakage Class II • Airfoil Blade • 250°F • Smoke Damper
For Volume Control Applications

Operations Ratings:

Maximum Differential Pressure: 4 in. wg
Maximum Velocity: 2000 fpm

Leakage Ratings:

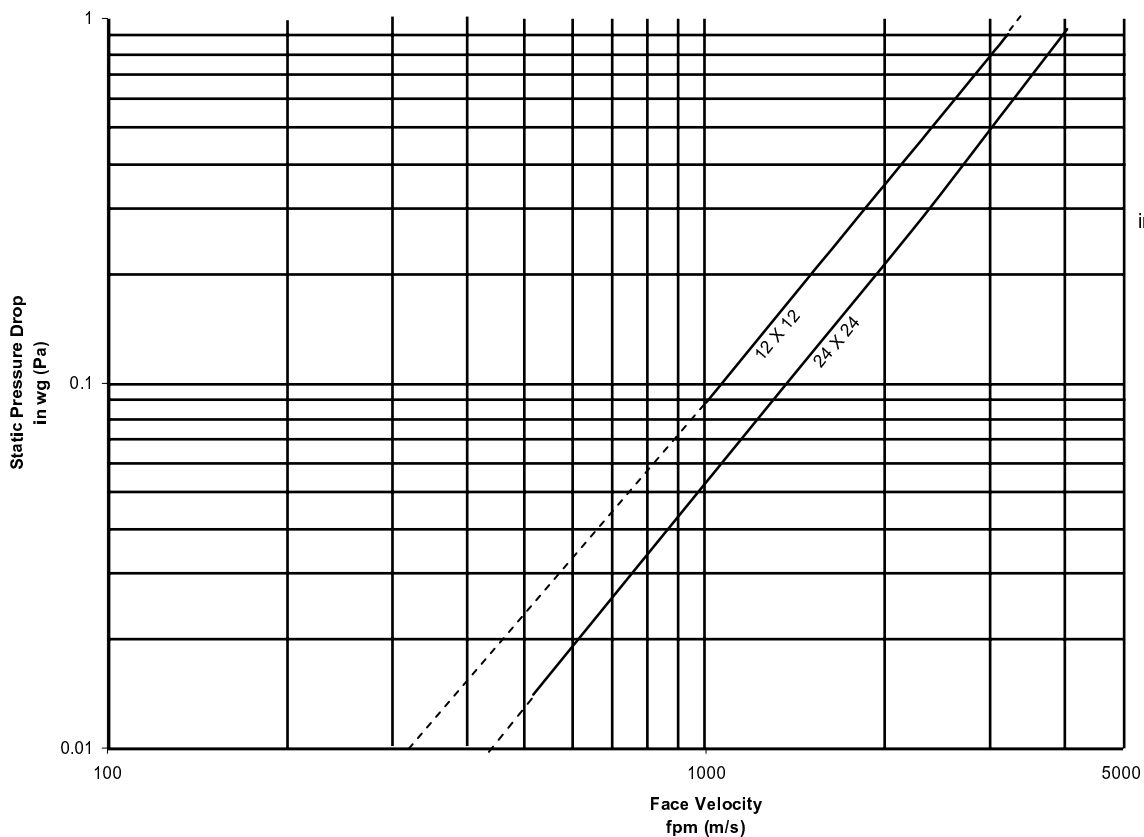
UL Class II
10 cfm per sq. ft. maximum @ 1 in. wg
20 cfm per sq. ft. maximum @ 4 in. wg

Sound Ratings:

None Available

Pressure Drop Ratings:

The Pressure drop data shown below is based on laboratory conditions. The test setup does not take into account elbows or other duct fittings that are part of every actual duct system. The configuration of the actual duct system immediately upstream and downstream of the damper often contributes more pressure loss than the damper itself.

SA2M Pressure Drop

This product was tested
in accordance with AMCA
Standard 500D.

AMCA FIGURE 5.3

SLEEVES & SIDEPLATES

Smoke Damper Models: S, SG, KH, A, SA, GA, KA, AA

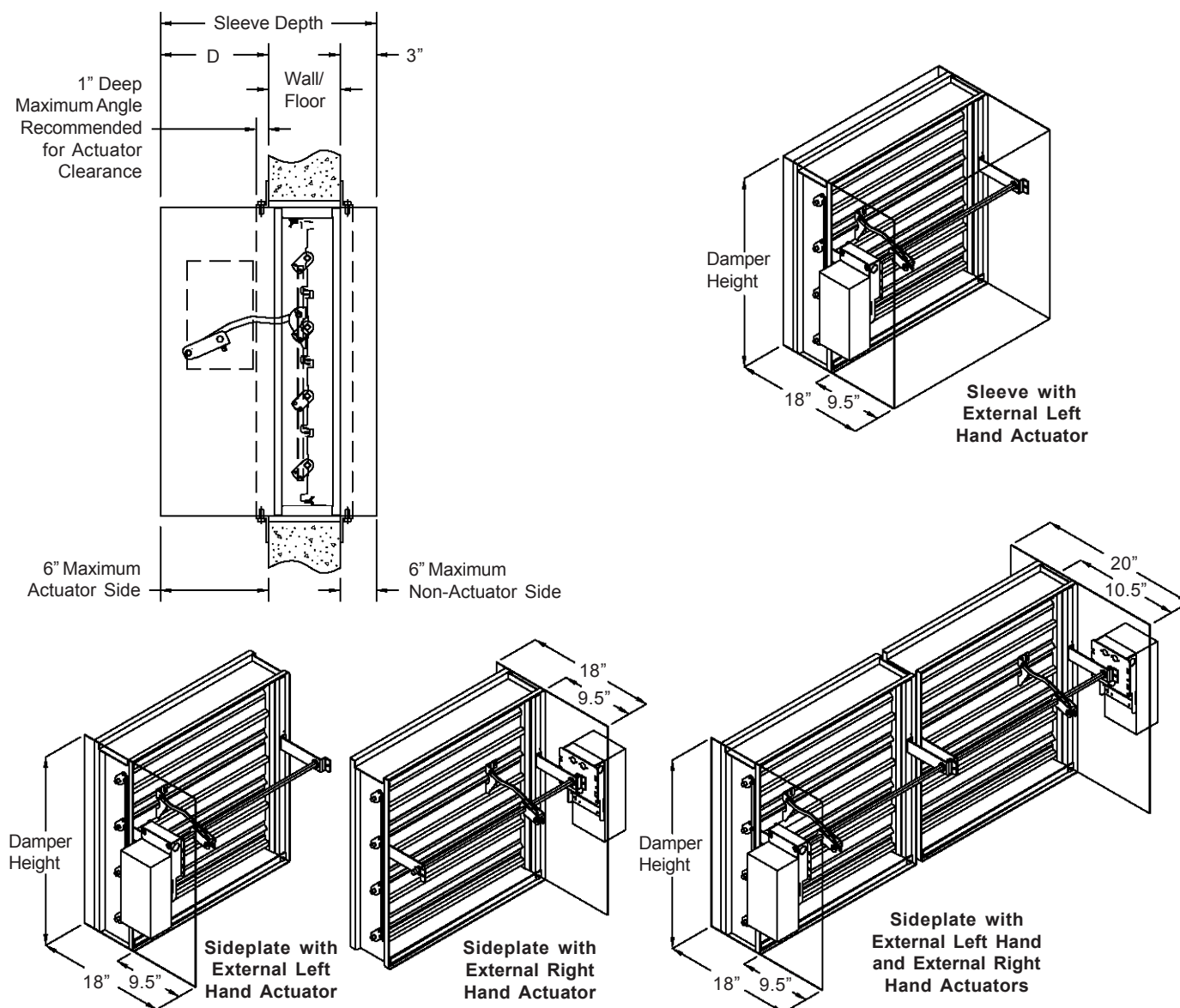
Notes

1. Sleeves may be factory provided or field provided, but are not required. Reference damper installation instruction for sleeve attachment procedure.
2. Large units that require multiple ship sections will be individually sleeved if sleeve is factory provided.
3. Units with externally mounted actuators require a factory supplied sleeve or sideplate.
4. The standard sleeve is 20-GA x 18" deep (dampers that exceed 84" in width or height require minimum 18-GA sleeve).
5. 10-GA, 12-GA, 14-GA, 16-GA, and 18-GA sleeves are available.
6. Sleeve depths through 48" are available.
7. Refer to Installation Instruction II-S for sleeve attachment in the field.

Sleeve Depth Determination (for optional mounting in barrier)

The standard sleeve depth allows for an external actuator, 1" retaining angles on both sides of the wall, and 1.5" duct connections on both ends of the sleeve. Sleeve depth and "D" will increase by 1" if a factory-mounted smoke detector is required. A shorter sleeve may be provided and properly installed if internal actuators or one-side retaining angles are utilized, or if the duct connections on one or both ends of the damper are not required. Consult the factory for details.

Standard Sleeve Depth (18") = D (9") + wall/floor thickness (6") + non-actuator side distance (3").



SLEEVES & SIDEPLATES

Smoke Damper Models: S, SG, KH, A, SA, GA, KA, AA

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Florence, Kentucky, 41042
Phone: (859) 538-3400
Fax: (800) 241-9344
Web Site: www.airbalance.com

Product Guide Specification

SECTION 15820

SMOKE DAMPERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Smoke dampers with blades using triple reinforcement grooves meeting the requirements of the latest edition of UL Standard 555S.

1.2 RELATED SECTIONS

- A. Section 15810 - Ducts.

1.3 REFERENCES

- A. AMCA 500 - Test Methods for Louvers, Dampers and Shutters.
- B. AMCA 511 - Certified Ratings Program for Air Control Devices.
- C. BOCA – Building Officials and Code Administrators.
- D. ICBO – International Conference of Building Officials.
- E. SBCCI – Southern Building Code Congress International.
- F. IBC – International Building Code.
- G. CSFM - California State Fire Marshall Listing for Fire Damper and Smoke Damper.
- H. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.
- I. NFPA 92A - Smoke-Control Systems.
- J. NFPA 92B – Smoke Control Systems in Atria, Covered Malls, and Large Areas.
- K. NFPA 101 – Life Safety Code.

- L. UL 555S - Standard for Safety; Leakage Rated Dampers for Use in Smoke Control Systems.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product data.
 - 1. Include UL ratings, leakage, pressure drop, and maximum pressure data.
 - 2. Indicate materials, construction, dimensions, and installation details.
 - 3. Verify conformance to NFPA, UL, CSFM, and applicable building code.
 - 4. Include damper pressure drop data based on tests and procedures performed in accordance with AMCA 500.

1.5 QUALITY ASSURANCE

- A. Dampers shall be warranted against manufacturing defects for a period of 5 years.
- B. Dampers shall be tested, rated and labeled in accordance with the latest UL requirements.
- C. Damper pressure drop ratings shall be based on tests and procedures performed in accordance with AMCA 500 and certified by AMCA (if applicable).

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
- B. Storage: Store materials in a dry area indoor, protected from damage and in accordance with manufacturer's instructions.
- C. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Air Balance, P.O. Box 606, 7435 Industrial Road, Florence, Kentucky, 41042. Phone (859) 538-3400, Fax (800) 241-9344, Web Site www.airbalance.com

2.2 SMOKE DAMPERS

- A. Model: SR series smoke dampers.
- B. Ratings:
 - 1. Smoke Rating:
 - ☐ SR - Leakage Class II Smoke Damper in accordance with UL555S. A Class II smoke damper leaks no more than 20 cubic feet per minute (.57 m³/min) at 4 in. wg. (1 kPa) differential pressure.

- ☐ SR - Leakage Class I Smoke Damper in accordance with UL555S. A Class I smoke damper leaks no more than 8 cubic feet per minute (.23 m³/min) at 4 in. wg. (1 kPa.) differential pressure.

2. Elevated Temperature Rating:

- ☐ 250°F (121°C) in accordance with UL555S.
- ☐ 350°F (177°C) in accordance with UL555S.

4. Air Flow Rating: 2000 fpm (10.2 m/s) in accordance with UL555S.

5. Differential Pressure Rating: 4 in. wg. in accordance with UL555S.

6. Pressure Drop: Pressure drop for a 12" x 12" (305 mm x 305 mm) unit at a face velocity of 2000 fpm (10.2 m/s) unit shall be no more than 0.164 in. wg. (40.9 Pa).

C. Construction:

1. Frame: Sizes 24" x 24" (610 mm x 610 mm) and smaller shall be constructed with an integral sleeve/frame design and use a single blade through 12" (304 mm) high for maximum free area. One set of perimeter mounting angles shall be factory attached to stiffen the frame design and to supply a fool-proof, user-friendly construction to reduce field installation labor.

2. Blades:

- a. Style: Single skin with 3 longitudinal grooves.
- b. Action: Parallel.
- c. Material: Minimum 18 gage (1.6 mm) galvanized steel.
- d. Width: Maximum 11 ½" (152 mm).

3. Bearings: Self-lubricating oil impregnated bronze sleeve type, turning in an extruded hole in the damper frame.

4. Seals:

- a. Blade: Silicone material to maintain smoke leakage rating to a minimum of 350°F (177°C).
- b. Jamb: Stainless steel, flexible metal compression type.

5. Linkage: On blade.

6. Axles: Plated steel mechanically attached to the blade.

7. Mounting: Vertical and/or Horizontal.

8. Release Device: Signal-Actuated.

- a. Close (in a controlled manner) and lock damper during test, smoke detection, or power failure through actuator closure spring. At no time shall actuator disengage from damper blades.
 - b. Allow damper to be automatically and remotely reset after test or power failure conditions.
 - c. Gradual closing and locking of damper in 7 to 15 seconds to allow duct pressure to equalize. Instantaneous closure is not acceptable.
9. Actuator:
- a. Type:
 - ☐ Electric 120 V, 60 Hz, two-position, fail close.
 - ☐ Electric 24V, 60 Hz, two-position, fail close.
 - ☐ Pneumatic, 20-psi minimum control pressure, two-position, fail close.
 - b. Mounting:
 - ☐ External.
10. Finish: Mill galvanized.

2.3 ACCESSORIES

A. Indicator or Auxiliary Switch Package:

- ☐ Switch Package – two-position indicator switches linked directly to damper to remotely indicate damper blade position.

B. Duct Smoke Detector:

1. Model:

- ☐ SM-501-P.
- ☐ 2151 (requires factory supplied remote test station).

2. Mounting:

- ☐ Factory Mounted, unwired (SM-501-P only).
- ☐ Factory Mounted and wired.
- ☐ Shipped Loose for Field Installation.

3. Type:

- ☐ Photoelectric.

C. Factory Sleeve:

1. 20 gage (1.0 mm) thickness; optional thickness to 16 gage (1.5 mm).
2. Standard sleeve depth is 16 inches (406 mm) long; optional depth to 20 inches (508 mm).
3. Silicone caulk is factory applied to sleeve and damper frame or jamb seal to comply with Class 1 and 2 leakage ratings.

E. Mounting Angles:

- a. 1 ½" x 7/8" x 16 gauge (38 mm x 20 mm x 1.5 mm) galvanized steel perimeter tab lock mounting angles; one set factory mounted.

2.4 SOURCE QUALITY CONTROL

- A. Factory Tests: Factory cycle damper and actuator assembly to assure proper operation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Inspect areas to receive dampers. Notify the Engineer of conditions that would adversely affect the installation or subsequent utilization of the dampers. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install dampers at locations indicated on the drawings and in accordance with manufacturer's UL approved installation instructions.
- B. Install dampers square and free from racking with blades running horizontally.
- C. Do not compress or stretch damper frame into duct or opening.
- D. Handle damper using sleeve or frame. Do not lift damper using blades, actuator, or jackshaft.
- E. SR series smoke dampers are for single panel dampers only.

END OF SECTION

air balance

Dampers  Louvers
UL Life Safety Products

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Dampers  Louvers
UL Life Safety Products

UL Installation Instructions

Fire Damper Models: 119, 119(SS), D19
Oversized Wall Openings Models: 119, 119(SS)
Fire Damper Models: 319, 319(SS), D39
Fire Damper Models: R19
Ceiling Radiation Dampers Models: 289, 291, 293, 295, 297
True Round Fire, F/S, and Smoke Models: RF, RC, RS
Combination F/S and Smoke Damper Models: FR1, FR2, SR1, SR2
Combination F/S and Fire Damper Models: FS, FT, FA, TA, MA19, MD19, MA39, MD39
S.S. Combination F/S and Fire Damper Models: FS1(SS), FS2(SS), MD19(SS)
One Side Retaining Instal. F/S Damper Models: FS, FA
Fire/Leakage Rated Corridor Damper Models: FS2C
Front Access (Grille Mount) Damper Models: FS1G/F, FS2G/F
Duct Smoke Detectors: FS, S
Smoke Damper Models: S, SA
Smoke Damper Models: S(SS)

air balance

Dampers  Louvers
UL Life Safety Products

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Standard Installation

Fire Damper Models: 119, 119(F), 119(SS), D19

APPLICATION

This fire damper is intended to restrict the passage of flame. The standard installation requires that the damper is positioned so that the closed plane of the blades is within the fire rated masonry/concrete or metal or wood framed gypsum wallboard barrier.

This damper may be mounted in the vertical or horizontal position with the damper blades running horizontally. Air flow can be from either direction. When mounted in the vertical position, the damper can be mounted in a fire barrier constructed of masonry/concrete or metal or wood framed gypsum wallboard materials. When mounted in the horizontal positions, the damper can only be mounted in a fire barrier constructed of masonry/concrete materials.

MULTIPLE PANEL SIZE LIMITATIONS

Orientation	Horizontal			Vertical		
	Max Panel	Max Assy 165°	Max Assy 212°	Max Panel	Max Assy 165°	Max Assy 212°
119A	48"Wx48"H	102"Wx48"H	102"Wx48"H	60"Wx60"H	120"Wx120"H	120"Wx120"H
119F	not available	not available	not available	40"Wx40"H	40"Wx40"H	40"Wx40"H
119B	48"Wx43"H duct	102"Wx43"H duct	102"Wx43"H duct	60"Wx55"H duct	120"Wx115"H duct	120"Wx115"H duct
	(48"Wx48"H frame)	(102"Wx48"H frame)	(102"Wx48"H frame)	(60"Wx60"H frame)	(120"Wx120"H frame)	(120"Wx120"H frame)
119C	46"Wx42"H duct	100"Wx42"H duct	100"Wx42"H duct	58"Wx54"H	118"Wx114"H	118"Wx114"H
	(48"Wx48"H frame)	(102"Wx48"H frame)	(102"Wx48"H frame)	(60"Wx60"H frame)	(120"Wx120"H frame)	(120"Wx120"H frame)
119AX	48"Wx48"H	48"Wx48"H	48"Wx48"H	60"Wx60"H	60"Wx60"H	60"Wx60"H
119BX	48"Wx43"H duct	48"Wx43"H duct	48"Wx43"H duct	60"Wx55"H duct	60"Wx55"H duct	60"Wx55"H duct
	(48"Wx48"H frame)	(48"Wx48"H frame)	(48"Wx48"H frame)	(60"Wx60"H frame)	(60"Wx60"H frame)	(60"Wx60"H frame)
119CX	46"Wx42"H duct	46"Wx42"H duct	46"Wx42"H duct	58"Wx54"H	58"Wx54"H	58"Wx54"H
	(48"Wx48"H frame)	(48"Wx48"H frame)	(48"Wx48"H frame)	(60"Wx60"H frame)	(60"Wx60"H frame)	(60"Wx60"H frame)
119A(SS)	48"Wx48"H	102"Wx48"H	102"Wx48"H	60"Wx60"H	120"Wx120"H	120"Wx120"H
119B(SS)	48"Wx43"H duct	102"Wx43"H duct	102"Wx43"H duct	60"Wx55"H duct	120"Wx115"H duct	120"Wx115"H duct
	(48"Wx48"H frame)	(102"Wx48"H frame)	(102"Wx48"H frame)	(60"Wx60"H frame)	(120"Wx120"H frame)	(120"Wx120"H frame)
119C(SS)	46"Wx42"H duct	100"Wx42"H duct	100"Wx42"H duct	58"Wx58"H	118"Wx114"H	118"Wx114"H
	(48"Wx48"H frame)	(102"Wx48"H frame)	(102"Wx48"H frame)	(60"Wx60"H frame)	(120"Wx120"H frame)	(120"Wx120"H frame)
D19A	24"Wx24"H	24"Wx24"H	not available	36"Wx36"H	72"Wx36"H	72"Wx36"H
D19B	24"Wx21"H duct	24"Wx21"H duct	not available	36"Wx32"H duct	72"Wx32"H duct	72"Wx32"H duct
	(24"Wx24"H frame)	(24"Wx24"H frame)		(36"Wx36"H frame)	(72"Wx36"H frame)	(72"Wx36"H frame)
D19C	22"Wx20"H duct	22"Wx20"H duct	not available	34"Wx31"H duct	70"Wx31"H duct	70"Wx31"H duct
	(24"Wx24"H frame)	(24"Wx24"H frame)		(36"Wx36"H frame)	(72"Wx36"H frame)	(72"Wx36"H frame)
D19AX	24"Wx24"H	24"Wx24"H	not available	36"Wx36"H	36"Wx36"H	36"Wx36"H
D19BX	24"Wx21"H duct	24"Wx21"H duct	not available	36"Wx32"H duct	36"Wx32"H duct	36"Wx32"H duct
	(24"Wx24"H frame)	(24"Wx24"H frame)		(36"Wx36"H frame)	(36"Wx36"H frame)	(36"Wx36"H frame)
D19CX	22"Wx20"H duct	22"Wx20"H duct	not available	34"Wx31"H duct	34"Wx31"H duct	34"Wx31"H duct
	(24"Wx24"H frame)	(24"Wx24"H frame)		(36"Wx36"H frame)	(36"Wx36"H frame)	(36"Wx36"H frame)

SUPPLEMENTAL INSTALLATION INSTRUCTIONS / SUBMITTAL DATA

One-Side Retaining Angles
Out-of-Wall/Floor
Sleeve Extension
Integral Duct Access Door
Transfer Openings
Flanged Connections
Steel Deck
Security Bars
Transitions
Sleeves

INSTALLATION

1. **General:** The installation of the damper and all duct connections to the damper sleeve shall conform to NFPA-90A and the SMACNA Fire, Smoke and Radiation Damper Installation Guide. All duct connections shall also conform to UL555.
2. **Multiple Panel / Multiple Section Assembly:** Refer to page 5 for details.
3. **Sleeves:** Sleeves are required for the proper installation of fire rated dampers, but need not be factory mounted. Sleeves shall be the same gauge or heavier as the duct to which it is attached. Gauges shall conform to SMACNA or ASHRAE duct standards. A field supplied sleeve is attached to the damper frame with $\frac{3}{16}$ " diameter steel rivets, $\frac{1}{4}$ " diameter steel bolts, #10 steel sheet metal screws, or $\frac{1}{2}$ " long welds. Fasteners shall be staggered on each side of the damper frame on 8" maximum centers and 3- $\frac{1}{2}$ " maximum from each corner. The sleeve shall not extend more than 6" beyond the fire barrier unless the sleeve includes an access door. If the sleeve includes an access door, the sleeve may extend up to a maximum of 16" beyond the fire barrier.
4. **Expansion Clearance:** The opening in the wall for the fire rated damper shall be sized to provide expansion clearance between the sleeve and the opening. The minimum expansion clearance shall be the greater of $\frac{1}{4}$ " or $\frac{1}{8}$ " per foot of overall damper/sleeve width and height. The maximum expansion clearance shall not exceed $\frac{1}{8}$ " per foot of overall damper/sleeve width and height plus 2".

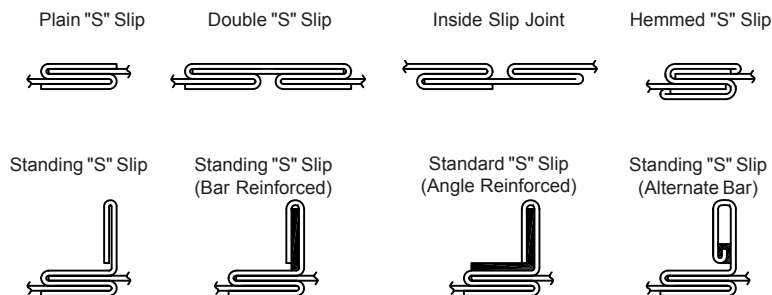
Example: For a damper with exact outside dimensions of 36"W x 48"H, the gap at the top plus the gap at the bottom must be between 0.5" and 2.5". The gap at the left side plus the gap at the right side must be between 0.375" and 2.375". The damper can be located anywhere in the opening and need not be centered.
5. **Damper Orientation:** Dampers mounted vertically must be installed so the blades are at the top. The damper can be positioned so that airflow is from either direction. For dampers with springs, it is best to have access to the side of the damper opposite the leading blade edge. The pull ring option can be utilized when this is not practical. Dampers mounted horizontally must be installed so that the blade lock points are facing downward. The airflow can be from either direction. It is best to have access to the side at the damper opposite the leading blade edge (top side). The pull ring option can be utilized when this is not practical.
6. **Retaining Angle Attachment:** Perimeter retaining angles shall increase in size, proportionately, so there will be a minimum of 1" overlap on the wall, including at the corners. The angles shall be flush against the barrier. The leg attached to the damper can turn away from or into the opening. In metal frame construction, the angles can be mounted under or over the gypsum board. In wood frame construction, the angles must be mounted over the gypsum board. The perimeter mounting angles shall be fastened on all four sides and on both faces of the damper to the sleeve only, with $\frac{3}{16}$ " diameter steel or stainless steel nuts and bolts or by tack welding with beads $\frac{1}{2}$ " \pm $\frac{1}{4}$ " in length or with #10 steel or stainless steel sheet metal screws or $\frac{3}{16}$ " steel or stainless steel pop rivets. All connections shall be spaced on 8" maximum centers and 3" maximum from each corner (a minimum of 2 fasteners are required per side). For perimeter angle mounting on one side of the fire barrier only, reference Installation Instruction II-FSOS. Perimeter retaining angles shall be a minimum of 1- $\frac{1}{2}$ " x $\frac{7}{8}$ " x 16-GA steel. Corners of angles are not welded together for dampers with width or height dimensions exceeding 24". For dampers 24"W x 24"H or smaller, the corners of the perimeter mounting angles can be welded. Some local codes may not allow welded corners. Attachment of these angles must not restrict operation of the damper. Perimeter retaining angles and their mounting fasteners are not typically supplied with the damper.
7. **Caulking:** Caulk shall be one of the following: Dow Corning RTV732, Silco Sil-Bond RTV 4500, General Electric IS808, or Novagard RTV300. Caulking is allowed between the retaining angles and the damper sleeve, and between the retaining angles and the face of the floor or wall construction. Caulking is not allowed between the damper sleeve and the wall or floor inside the opening.

Breakaway flange caulking shall be Design Polymeric's DP1010 or Precision's PA2084T.



INSTALLATION (CONTINUED)

8. **Duct Connections:** All connecting ducts shall not be continuous, but shall terminate at the fire damper sleeve. Duct connections not listed as breakaways shall be considered rigid. For rigid type duct connections, the sleeve shall be a minimum of 16-GA on dampers not exceeding 36" wide or 24" high or 24" diameter and 14-GA on larger units. Maximum sleeve thickness shall not exceed 10-GA galvanized steel. Dampers supplied with thinner sleeves require a breakaway connection. The following breakaway duct-to-sleeve connections may be used: Plain "S" Slip, Double "S" Slip, Inside Slip, Hemmed "S" Slip, Standing "S" Slip, Standing "S" Slip (Bar Reinforced), Standing "S" Slip (Angle Reinforced), and Standing "S" Slip (Alternate Bar). Breakaway joints shall have no more than two No. 10 sheet metal screws on each side and on the bottom. The screws shall penetrate both sides of the slip pocket. When a breakaway joint is used along the top and bottom duct connection, a flat drive slip no longer than 20 inches is permitted on the two sides.

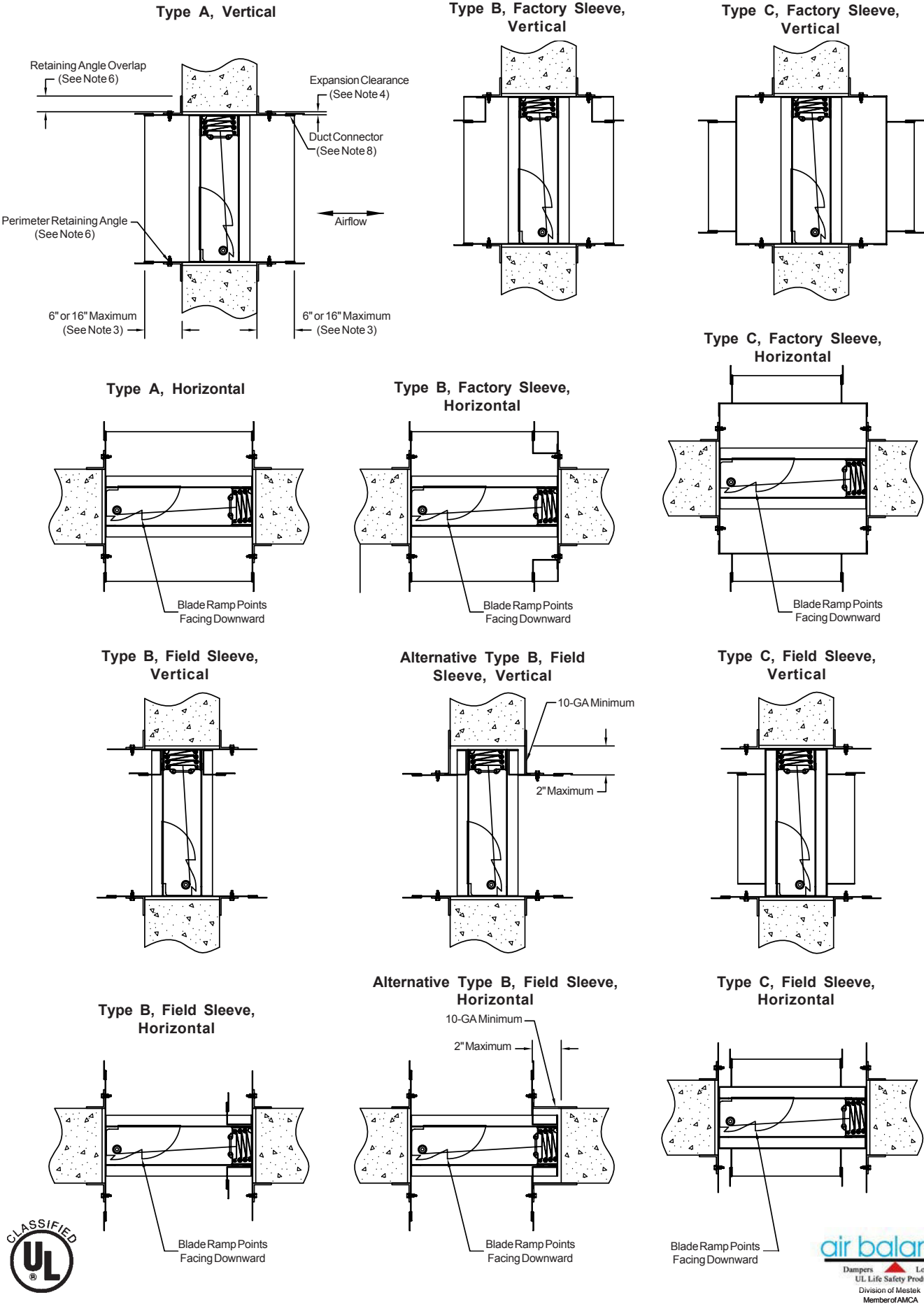


The factory supplied round/oval transition provides the breakaway connection if the following conditions are satisfied.

1. Round duct diameter is no larger than 36".
2. Oval duct size is no larger than 71"W x 30"H.
3. Duct gauges conform to the SMACNA or ASHRAE standard.
4. An oval duct or round duct less than or equal to 24" is attached to the transition collar with #8 sheet metal screws (a minimum of 4 fasteners per connection). A round duct diameter greater than 24" is attached to the transition collar with #10 sheet metal screws (a minimum of 5 fasteners per connection).

Dampers with round/oval transitions that fall outside of these restrictions must use a 4" wide drawband connection as shown in the SMACNA Fire, Smoke, and Radiation Damper Installation Guide.

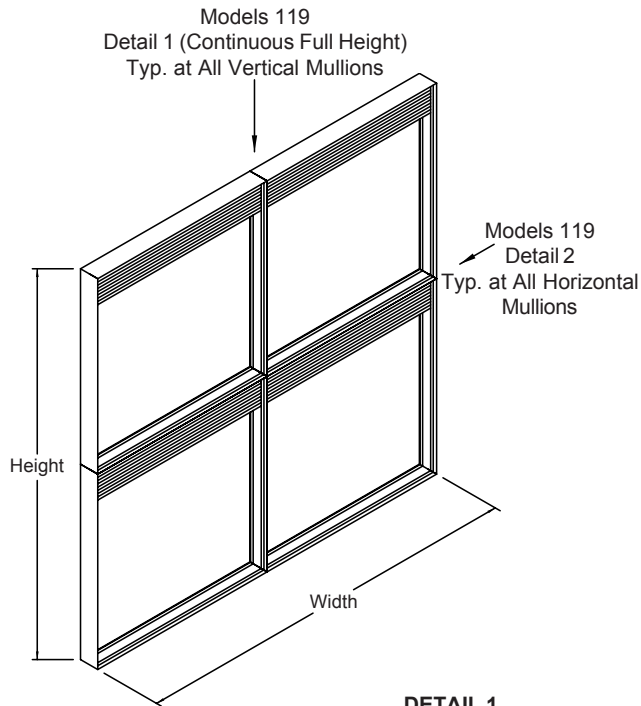
9. **Maintenance:** Dampers shall be maintained at intervals as stated in NFPA 90A and 92A. Local codes or building conditions may require more frequent inspections and maintenance. A duct access door is to be located on one side of each damper for periodic inspection and maintenance.



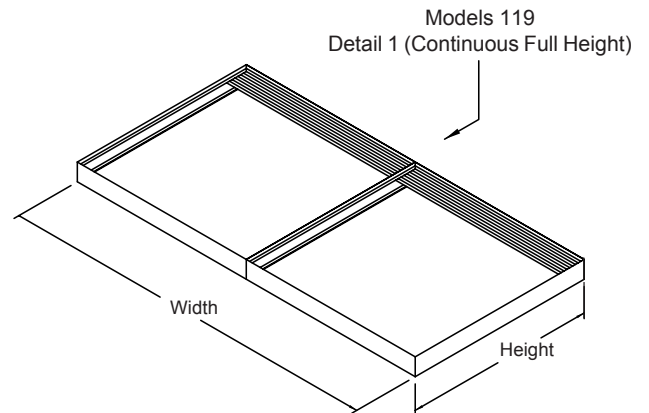
MULTIPLE PANEL / MULTIPLE SECTION INSTALLATION DETAILS

1. Damper assemblies ordered without factory mounted sleeves typically ship in individual panels to be field assembled.
2. Damper assemblies ordered with factory mounted sleeves ship assembled. Due to shipping limitations large damper assemblies may require more than one ship section. If more than one ship section is required, each ship section will be individually sleeved.
3. Mullion stiffeners are required per the illustrations below. The details shown are typical for all mullions in the same direction for that mounting orientation. For ship loose panels, mullion stiffeners are typically not provided by the factory. For single ship section sleeved dampers, mullion stiffeners will ship assembled as required. For multiple ship section sleeved dampers, the mullion stiffeners will ship assembled as required within each sleeved section. Mullion stiffeners are not required between the sleeved sections.
4. For vertical installations where the wall/floor opening is larger than the approved maximum assembly size, the approved mullion (illustrated on pages 7 and 8) must separate the large opening into smaller openings. This is approved for static systems only. For installations not covered by this method, the Local Authority Having Jurisdiction must approve a mullion to separate the large opening into smaller openings.
5. Mullion details specified are based on the fire ratings qualification tests. The user is responsible for additional structural supports of multiple section dampers when required by elevated air pressure differential in the closed position and in some cases seismic loading.

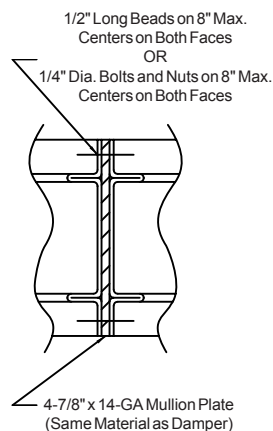
Vertical Installation



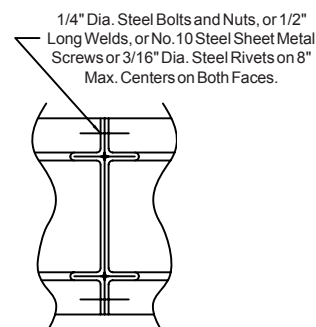
Horizontal Installation



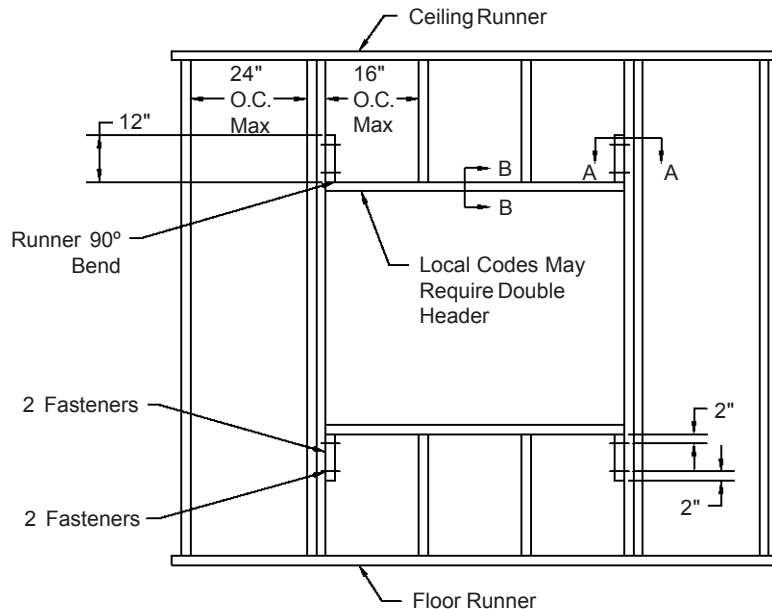
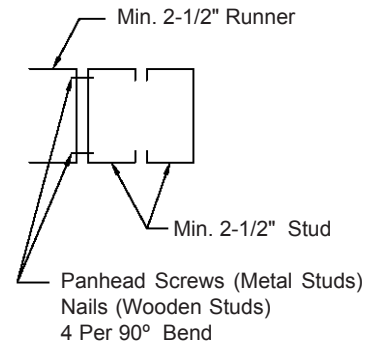
DETAIL 1



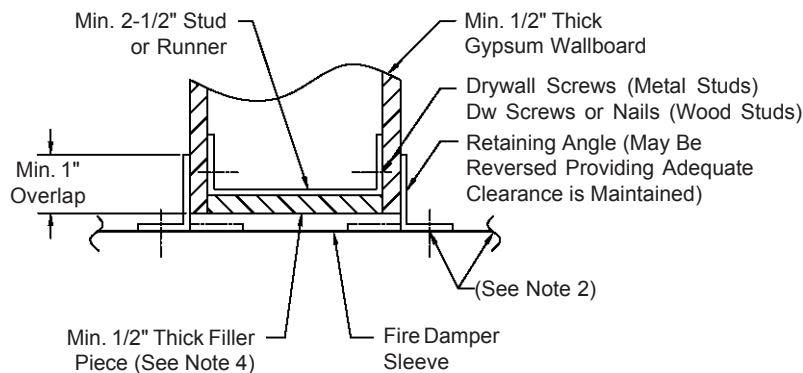
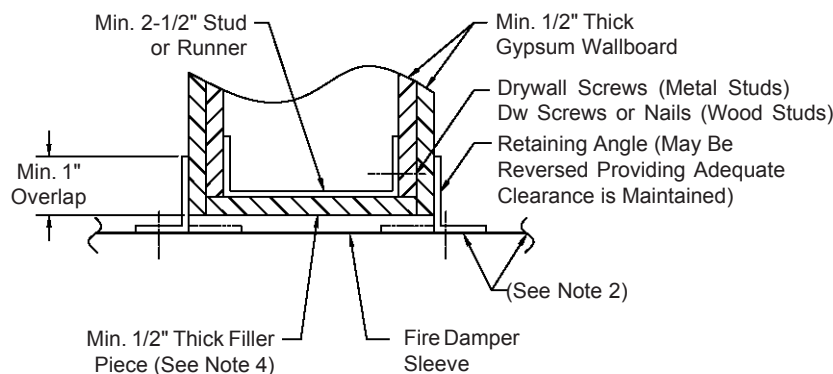
DETAIL 2



FRAMING DETAILS (METAL OR WOOD 1 HOUR AND 2 HOUR RATED BARRIERS)

**Section A-A****NOTES:**

1. These illustrated partition designs have successfully been tested in conjunction with 1-1/2 hour classified fire dampers, for additional designs, reference Underwriters Laboratories, Inc. Fire Resistance Directory. Specific framing requirements of openings may vary with the Local Authority that has jurisdiction. Specific framing requirements should be provided in the architectural and structural drawings.
2. Reference the damper's installation instructions regarding the approved method of attaching the damper to the sleeve, attaching the retaining angles to the sleeve, required expansion clearances, sleeve gauge, etc. Type of framing does not affect the stated required expansion clearance.
3. Gypsum panels surrounding the opening are to be fastened to all stud and runner flanges, 12" o.c. maximum.
4. When wooden studs are used, filler pieces must be installed around the entire opening. Filler pieces are optional when metal studs are used (consult local codes to determine if filler pieces are required). Filler pieces are to be double screwed (or nailed to wooden studs) on 12" max. centers to the web of runners and studs.
5. Double jamb studding shown and required when opening width or length exceeds 36". Single jamb studding acceptable for openings 36"W x 36"H and smaller.

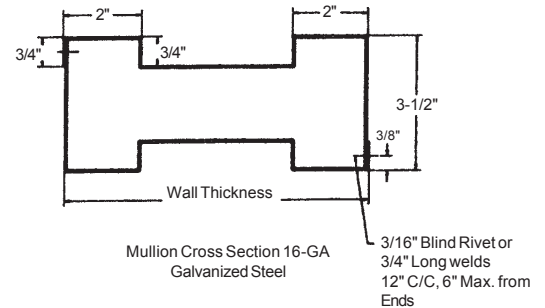
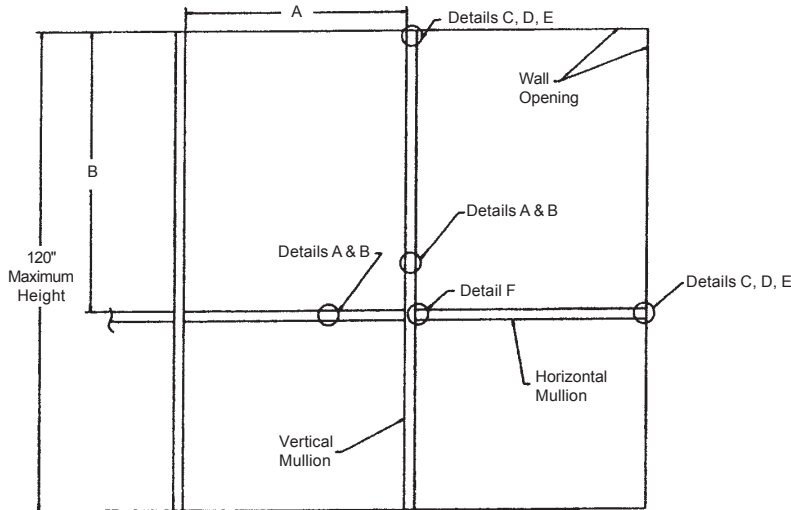
Section B-B
(1 Hour Rated Fire Barrier)**Section B-B**
(2 Hour Rated Fire Barrier)

Installed in Oversized Wall Openings

Mullion Installation Instructions for Fire Damper Models: 119, 119(F), 119(SS)

APPLICATION

These fabricated galvanized steel mullions are intended to subdivide a large vertical wall opening into smaller openings. These smaller openings are not to exceed the maximum size restrictions of the UL Classified 1-1/2 hour galvanized steel fire damper assembly.

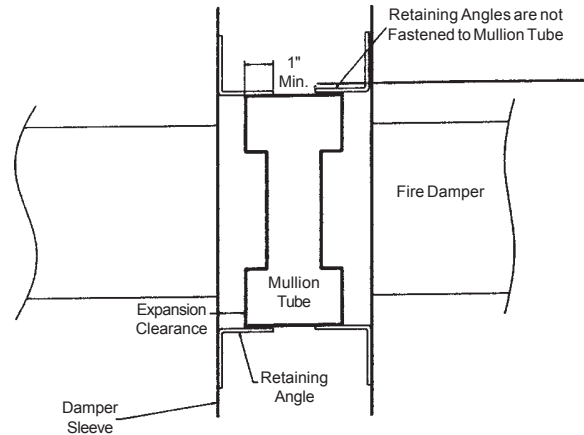


DETAIL A

'A' and 'B' opening sizes are not to exceed the damper's approved maximum multiple assembly size. Vertical, horizontal, or vertical and horizontal mullions can be used, depending on the opening size.

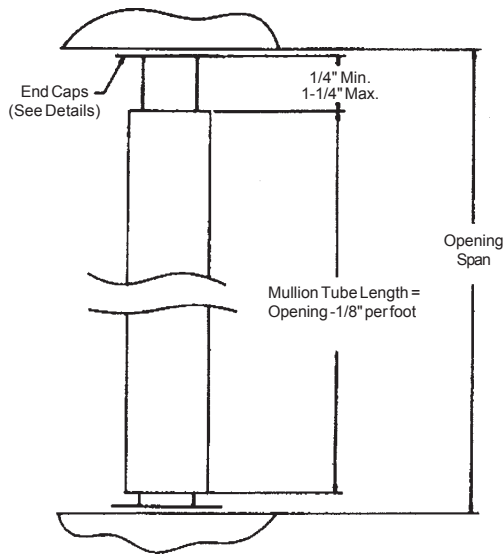
CONDITIONS & RESTRICTIONS

- Fabricated from galvanized steel with a nominal yield strength of 42,000 psi.
- Intended for use in concrete block or poured walls only with a minimum wall thickness of 7" and a maximum wall thickness of 12".
- To permit proper embedding of anchors, hollow concrete block walls are to be filled at the opening by minimum 3,500 psi concrete.
- Steel mullions are not to be inside the ductwork. For ducted systems, each sub-divided opening must be individually ducted.



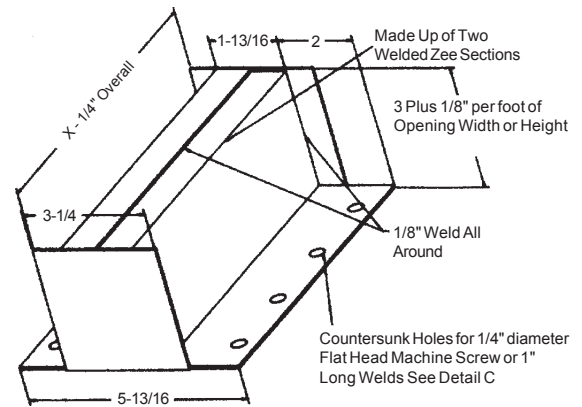
DETAIL B

Reference the damper's installation instructions regarding the approved method of attaching the damper to the sleeve, attaching the retaining angles to the sleeve, required expansion clearances, sleeve gauge, etc.



DETAIL C

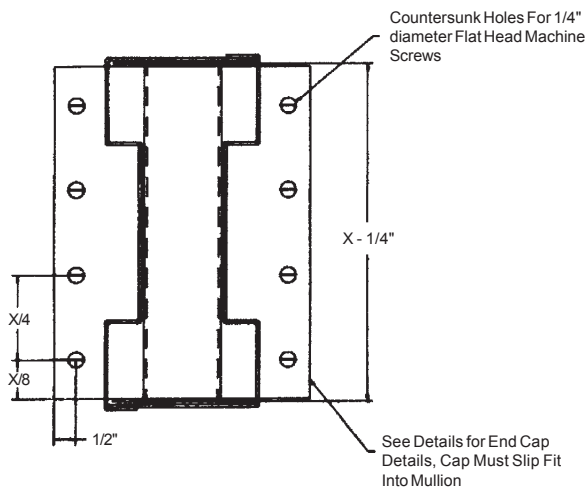
The end caps are attached by means of 1" long x $\frac{3}{8}$ " dia. steel expansion anchors embedded into the opening with $\frac{1}{4}$ " dia. flat head machine screws, eight per end cap. If a steel lintel is used, four 1" long welds per end cap (two per leg) may be used.



DETAIL D

Top, bottom or side end caps
12 GA galvanized steel

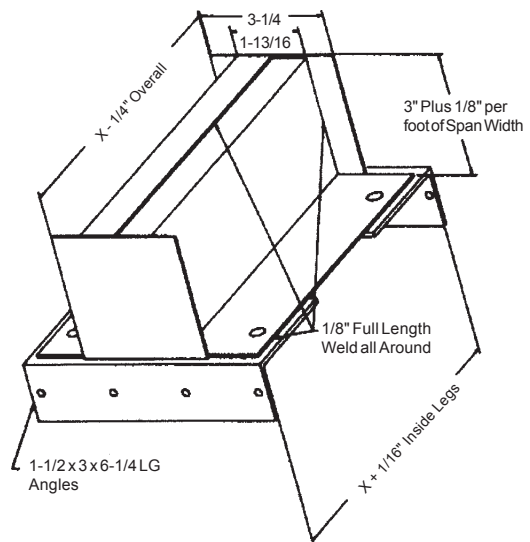
X = WALL THICKNESS



DETAILE

ENDCAP INSERTED INTO MULLION

All horizontal and vertical mullion tubes must be terminated with an end cap. These end caps may not be fastened to the mullion tube and must slide freely inside the mullion tube.



DETAIL F

HORIZONTAL TO VERTICAL MULLION END CAP 12-GA
GALVANIZED STEEL

Attach the horizontal mullion end caps to the vertical mullion tube by means of (12) $\frac{3}{16}$ " dia. blind rivets or by $\frac{1}{8}$ " full length weld.

Standard Installation

Fire Damper Models: 319, 319(SS), D39

APPLICATION

This fire damper is intended to restrict the passage of flame. The standard installation requires that the damper is positioned so that the closed plane of the blades is within the fire rated masonry/concrete or metal or wood framed gypsum wallboard barrier.

This damper may be mounted in the vertical or horizontal position with the damper blades running horizontally. Air flow can be from either direction. When mounted in the vertical position, the damper can be mounted in a fire barrier constructed of masonry/concrete or metal or wood framed gypsum wallboard materials. When mounted in the horizontal positions, the damper can only be mounted in a fire barrier constructed of masonry/concrete materials.

MULTIPLE PANEL SIZE LIMITATIONS

Orientation	Horizontal			Vertical		
	Max Panel	Max Assy 165°	Max Assy 212°	Max Panel	Max Assy 165°	Max Assy 212°
Assembly						
319A	48"Wx48"H	72"Wx36"H	72"Wx36"H	36"Wx36"H	72"Wx72"H	72"Wx72"H
319B	48"Wx43"H duct (48"Wx48"H frame)	72"Wx32"H duct (72"Wx36"H frame)	72"Wx32"H duct (72"Wx36"H frame)	36"Wx32"H duct (36"Wx36"H frame)	72"Wx68"H duct (72"Wx72"H frame)	72"Wx68"H duct (72"Wx72"H frame)
319C	46"Wx42"H duct (48"Wx48"H frame)	70"Wx31"H duct (72"Wx36"H frame)	70"Wx31"H duct (72"Wx36"H frame)	34"Wx31"H (36"Wx36"H frame)	70"Wx67"H (72"Wx72"H frame)	70"Wx67"H (72"Wx72"H frame)
319AX	48"Wx48"H	48"Wx48"H	48"Wx48"H	36"Wx36"H	36"Wx36"H	36"Wx36"H
319BX	48"Wx43"H duct (48"Wx48"H frame)	48"Wx43"H duct (48"Wx48"H frame)	48"Wx43"H duct (48"Wx48"H frame)	36"Wx32"H duct (36"Wx36"H frame)	36"Wx32"H duct (36"Wx36"H frame)	36"Wx32"H duct (36"Wx36"H frame)
319CX	46"Wx42"H duct (48"Wx48"H frame)	46"Wx42"H duct (48"Wx48"H frame)	46"Wx42"H duct (48"Wx48"H frame)	34"Wx31"H (36"Wx36"H frame)	34"Wx31"H (36"Wx36"H frame)	34"Wx31"H (36"Wx36"H frame)
319A(SS)	not available	not available	not available	47"Wx48"H	93"Wx48"H	93"Wx48"H
319B(SS)	not available	not available	not available	47"Wx42"H duct (47"Wx48"H frame)	93"Wx42"H duct (93"Wx48"H frame)	93"Wx42"H duct (93"Wx48"H frame)
319C(SS)	not available	not available	not available	45"Wx41"H duct (47"Wx48"H frame)	91"Wx41"H duct (93"Wx48"H frame)	91"Wx41"H duct (93"Wx48"H frame)
D39A	24"Wx24"H	24"Wx24"H	not available	36"Wx36"H	72"Wx36"H	72"Wx36"H
D39B	24"Wx21"H duct (24"Wx24"H frame)	24"Wx21"H duct (24"Wx24"H frame)	not available	36"Wx32"H duct (36"Wx36"H frame)	72"Wx32"H duct (72"Wx36"H frame)	72"Wx32"H duct (72"Wx36"H frame)
D39C	22"Wx20"H duct (24"Wx24"H frame)	22"Wx20"H duct (24"Wx24"H frame)	not available	34"Wx31"H duct (36"Wx36"H frame)	70"Wx31"H duct (72"Wx36"H frame)	70"Wx31"H duct (72"Wx36"H frame)
D39AX	24"Wx24"H	24"Wx24"H	not available	36"Wx36"H	36"Wx36"H	36"Wx36"H
D39BX	24"Wx21"H duct (24"Wx24"H frame)	24"Wx21"H duct (24"Wx24"H frame)	not available	36"Wx32"H duct (36"Wx36"H frame)	36"Wx32"H duct (36"Wx36"H frame)	36"Wx32"H duct (36"Wx36"H frame)
D39CX	22"Wx20"H duct (24"Wx24"H frame)	22"Wx20"H duct (24"Wx24"H frame)	not available	34"Wx31"H duct (36"Wx36"H frame)	34"Wx31"H duct (36"Wx36"H frame)	34"Wx31"H duct (36"Wx36"H frame)

SUPPLEMENTAL INSTALLATION INSTRUCTIONS / SUBMITTAL DATA

Sleeve Extension
Integral Duct Access Door
Flanged Connections
Steel Deck
Security Bars
Transitions
Sleeves

INSTALLATION

1. **General:** The installation of the damper and all duct connections to the damper sleeve shall conform to NFPA-90A and the SMACNA Fire, Smoke and Radiation Damper Installation Guide. All duct connections shall also conform to UL555.
2. **Multiple Panel / Multiple Section Assembly:** Refer to page 5 for details.
3. **Sleeves:** Sleeves are required for the proper installation of fire rated dampers, but need not be factory mounted. Sleeves shall be the same gauge or heavier as the duct to which it is attached. Gauges shall conform to SMACNA or ASHRAE duct standards. A field supplied sleeve is attached to the damper frame with 1" long welds. Fasteners shall be staggered on each side of the damper frame on 6" maximum centers and 2-3/4" maximum from each corner. The sleeve shall not extend more than 6" beyond the fire barrier unless the sleeve includes an access door. If the sleeve includes an access door, the sleeve may extend up to a maximum of 16" beyond the fire barrier.
4. **Expansion Clearance:** The opening in the wall for the fire rated damper shall be sized to provide expansion clearance between the sleeve and the opening. The minimum expansion clearance shall be the greater of 1/4" or 1/8" (3/16" for stainless steel) per foot of overall damper/sleeve width and height. The maximum expansion clearance shall not exceed 1/8" (3/16" for stainless steel) per foot of overall damper/sleeve width and height plus 2".

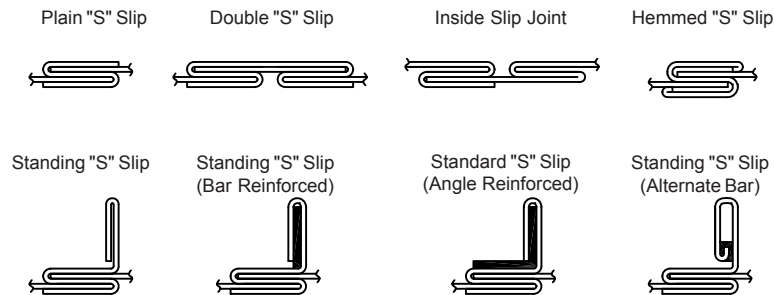
Example: For a galvanized damper with exact outside dimensions of 36"W x 48"H, the gap at the top plus the gap at the bottom must be between 0.5" and 2.5". The gap at the left side plus the gap at the right side must be between 0.375" and 2.375". The damper can be located anywhere in the opening and need not be centered.
5. **Damper Orientation:** Dampers mounted vertically must be installed so the blades are at the top. The damper can be positioned so that airflow is from either direction. For dampers with springs, it is best to have access to the side of the damper opposite the leading blade edge. The pull ring option can be utilized when this is not practical. Dampers mounted horizontally must be installed so that the blade lock points are facing downward. The airflow can be from either direction. It is best to have access to the side at the damper opposite the leading blade edge (top side). The pull ring option can be utilized when this is not practical.
6. **Retaining Angle Attachment:** Perimeter retaining angles shall increase in size, proportionately, so there will be a minimum of 1" overlap on the wall, including at the corners. The angles shall be flush against the barrier. The leg attached to the damper can turn away from or into the opening. The perimeter mounting angles shall be fastened on all four sides and on both faces of the damper to the sleeve only, with 1/4" diameter steel or stainless steel nuts and bolts or by tack welding with beads 1" in length. All connections shall be spaced on 6" maximum centers and 2-3/4" maximum from each corner (a minimum of 2 fasteners are required per side). Perimeter retaining angles shall be a minimum of 1-1/2" x 7/8" x 16-GA steel. Corners of angles are not welded together for dampers with width or height dimensions exceeding 24". For dampers 24"W x 24"H or smaller, the corners of the perimeter mounting angles can be welded. Some local codes may not allow welded corners. Attachment of these angles must not restrict operation of the damper. Perimeter retaining angles and their mounting fasteners are not typically supplied with the damper.
7. **Caulking:** Caulk shall be one of the following: Dow Corning RTV732, Silco Sil-Bond RTV 4500, General Electric IS808, or Novagard RTV300. Caulking is allowed between the retaining angles and the damper sleeve, and between the retaining angles and the face of the floor or wall construction. Caulking is not allowed between the damper sleeve and the wall or floor inside the opening.

Breakaway flange caulking shall be Design Polymeric's DP1010 or Precision's PA2084T.



INSTALLATION(CONTINUED)

8. **Duct Connections:** All connecting ducts shall not be continuous, but shall terminate at the fire damper sleeve. Duct connections not listed as breakaways shall be considered rigid. For rigid type duct connections, the sleeve shall be a minimum of 16-GA on dampers not exceeding 36" wide or 24" high or 24" diameter and 14-GA on larger units. Maximum sleeve thickness shall not exceed 10-GA galvanized steel. Dampers supplied with thinner sleeves require a breakaway connection. The following breakaway duct-to-sleeve connections may be used: Plain "S" Slip, Double "S" Slip, Inside Slip, Hemmed "S" Slip, Standing "S" Slip, Standing "S" Slip (Bar Reinforced), Standing "S" Slip (Angle Reinforced), and Standing "S" Slip (Alternate Bar). Breakaway joints shall have no more than two No. 10 sheet metal screws on each side and on the bottom. The screws shall penetrate both sides of the slip pocket. When a breakaway joint is used along the top and bottom duct connection, a flat drive slip no longer than 20 inches is permitted on the two sides.



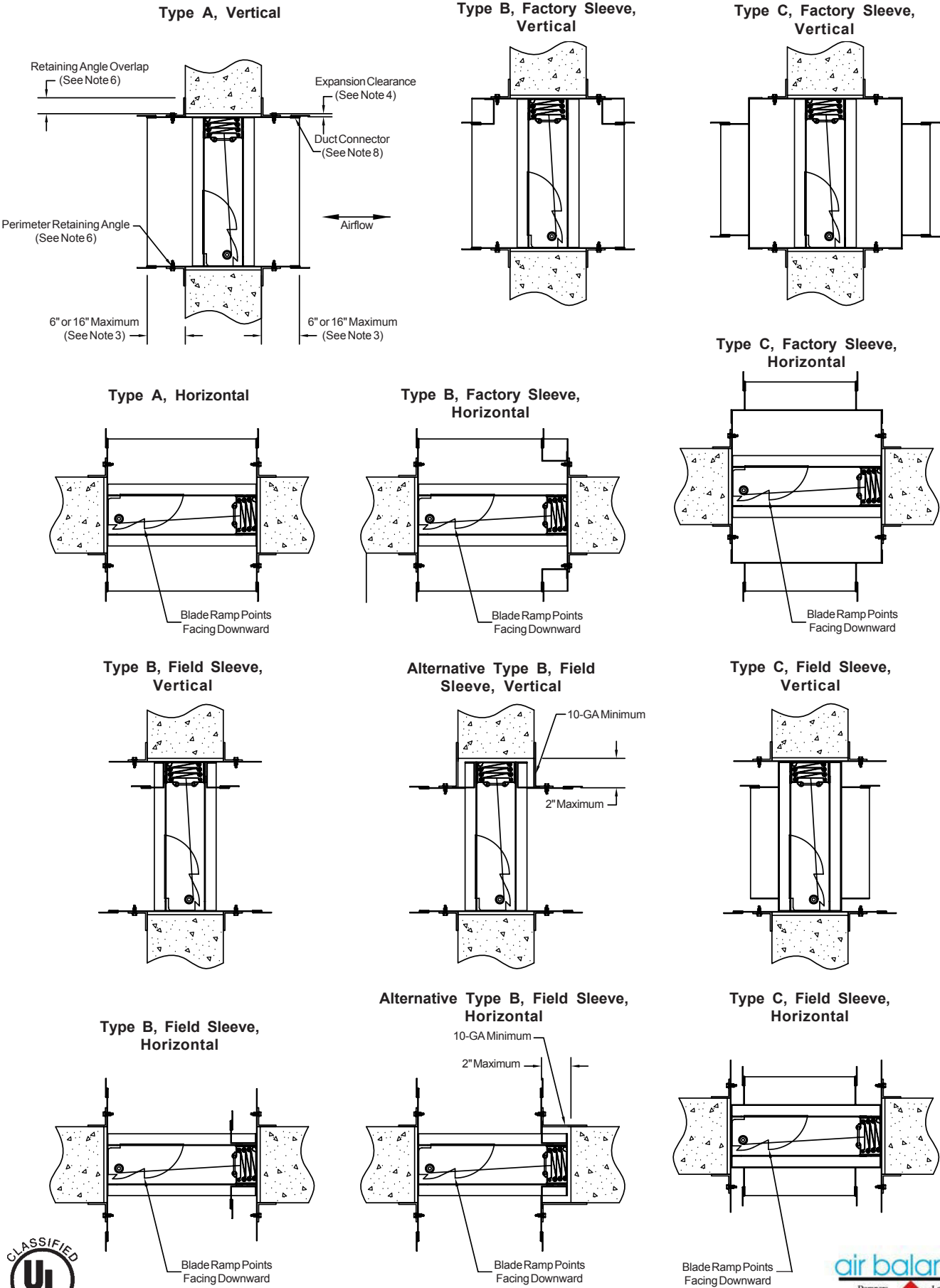
The factory supplied round/oval transition provides the breakaway connection if the following conditions are satisfied.

1. Round duct diameter is no larger than 36".
2. Oval duct size is no larger than 71"W x 30"H.
3. Duct gauges conform to the SMACNA or ASHRAE standard.
4. An oval duct or round duct less than or equal to 24" is attached to the transition collar with #8 sheet metal screws (a minimum of 4 fasteners per connection). A round duct diameter greater than 24" is attached to the transition collar with #10 sheet metal screws (a minimum of 5 fasteners per connection).

Dampers with round/oval transitions that fall outside of these restrictions must use a 4" wide drawband connection as shown in the SMACNA Fire, Smoke, and Radiation Damper Installation Guide.

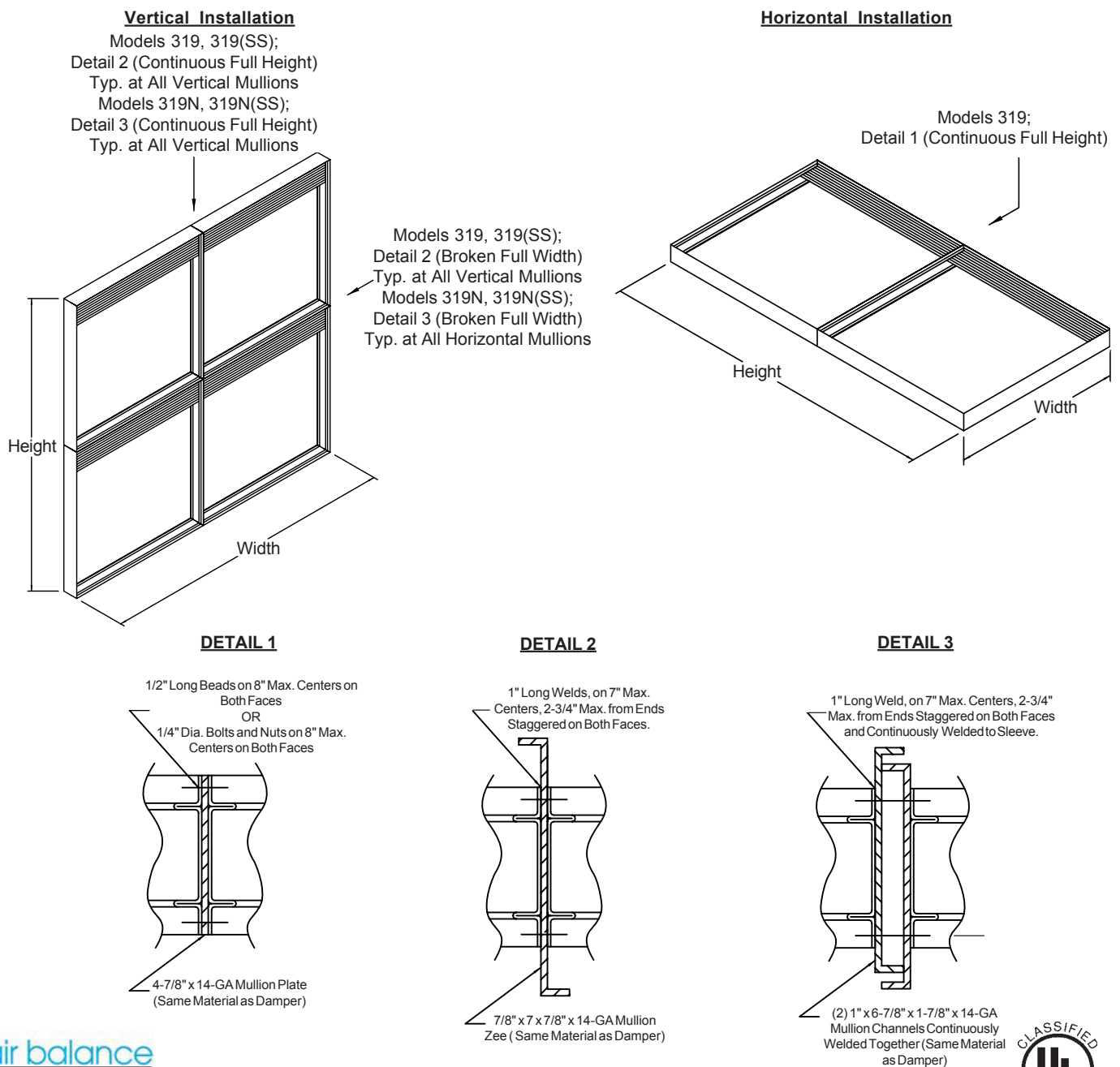
9. **Maintenance:** Dampers shall be maintained at intervals as stated in NFPA 90A and 92A. Local codes or building conditions may require more frequent inspections and maintenance. A duct access door is to be located on one side of each damper for periodic inspection and maintenance.

STANDARD MOUNTING DETAILS



MULTIPLE PANEL / MULTIPLE SECTION INSTALLATION DETAILS

1. Damper assemblies ordered without factory mounted sleeves typically ship in individual panels to be field assembled.
2. Damper assemblies ordered with factory mounted sleeves ship assembled. Due to shipping limitations large damper assemblies may require more than one ship section. If more than one ship section is required, each ship section will be individually sleeved.
3. Mullion stiffeners are required per the illustrations below. The details shown are typical for all mullions in the same direction for that mounting orientation. For ship loose panels, mullion stiffeners are typically not provided by the factory. For single ship section sleeved dampers, mullion stiffeners will ship assembled as required. For multiple ship section sleeved dampers, the mullion stiffeners will ship assembled as required within each sleeved section. Mullion stiffeners are not required between the sleeved sections.
4. For installations where the wall/floor opening is larger than the maximum assembly size, the Local Authority Having Jurisdiction must approve a mullion to separate the large opening into smaller openings.
5. Mullion details specified are based on the fire ratings qualification tests. The user is responsible for additional structural supports of multiple section dampers when required by elevated air pressure differential in the closed position and in some cases seismic loading.



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Standard Installation

Fire Damper Models: R19

APPLICATION

This fire damper is intended to restrict the passage of flame. The standard installation requires that the damper is positioned so that the closed plane of the blades is within the fire rated masonry/concrete or metal framed gypsum wallboard barrier.

This damper may be mounted in the vertical (dynamically rated) or horizontal (statically rated) position with the damper blades running horizontally. Airflow can be from either direction. When mounted in the vertical position, the damper can only be mounted in a fire barrier constructed of masonry/concrete or metal framed gypsum wallboard materials. When mounted in the horizontal position, the damper can only be mounted in a fire barrier constructed of masonry/concrete materials.

PANEL SIZE LIMITATIONS

Model	Orientation	Horizontal			Vertical		
	Assembly	Max Panel	Max Assy 165°	Max Assy 212°	Max Panel	Max Assy 165°	Max Assy 212°
R19		14" dia.	14" dia.	14" dia.	14" dia.	14" dia.	14" dia.

SUPPLEMENTAL INSTALLATION INSTRUCTIONS/SUBMITTAL DATA

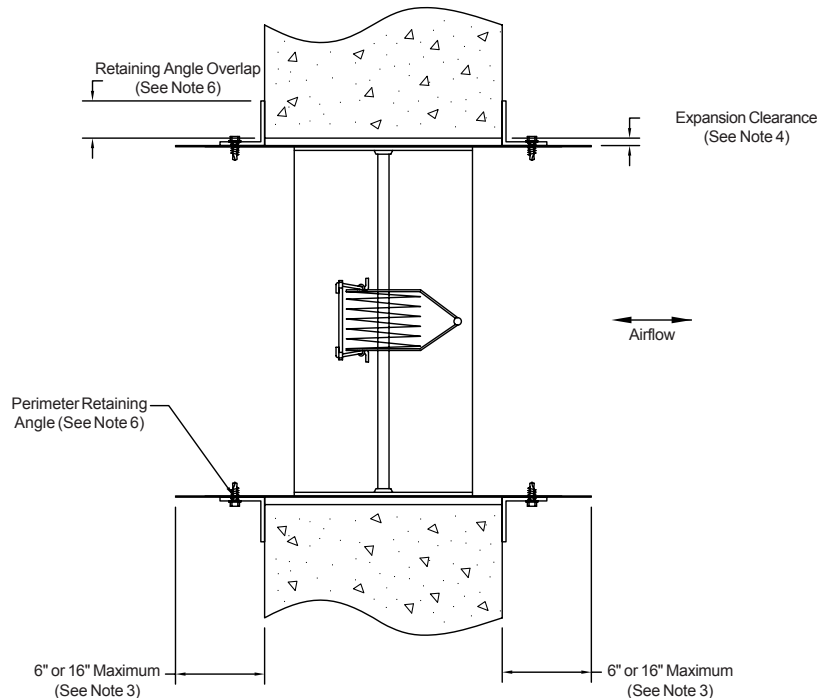
Retaining Angle Rings

INSTALLATION (Drawing on Page 2 of 4)

- General:** The installation of the damper and all duct connections to the damper sleeve shall conform to NFPA 90A and the SMACNA Fire, Smoke and Radiation Damper Installation Guide. All duct connections shall also conform to UL555.
- Multiple Panel / Multiple Section Assembly:** Not available.
- Sleeves:** Sleeves are required for the proper installation of fire rated dampers, but need not be factory mounted. Sleeves shall be the same gauge or heavier as the duct to which it is attached. Gauges shall conform to SMACNA or ASHRAE duct standards. A field supplied sleeve is attached to the damper with $\frac{3}{16}$ " diameter steel rivets, $\frac{1}{4}$ " diameter steel bolts, #10 steel sheet metal screws, or $\frac{1}{2}$ " long welds. Fasteners shall be staggered on each side of the damper frame on 8" maximum centers. The sleeve shall not extend more than 6" beyond the fire barrier unless the sleeve includes an access door. If the sleeve includes an access door, the sleeve may extend up to a maximum of 16" beyond the fire barrier.
- Expansion Clearance:** The opening in the wall for the fire rated damper shall be sized to provide expansion between the sleeve and the opening. The opening diameter is to be $\frac{1}{4}$ " larger than the outside diameter of the sleeve. When 1" retaining angles are used, the opening diameter shall be a maximum of $\frac{3}{4}$ " larger than the sleeve outside dimension. Opening differences larger than $\frac{3}{4}$ " will require a proportionally larger retaining angle leg overlapping the opening.
- Damper Orientation:** Damper blades should be as horizontal as possible but can be as much as 30° above or below the horizontal. The damper can be positioned so that airflow is from either direction. Dampers mounted horizontally must be positioned so that blade locks are in uppermost position. Blade locks must always be positioned towards the access door. Blade locks are only included on sizes 13" and 14" diameter.
- Retaining Angles:** Secure steel mounting angle rings to the sleeve only, so as to frame both faces of the opening. Mounting angle rings shall be a minimum of 1" x 1" x 20-GA. Fasten rings to the sleeve using the same means as required for fastening the damper to the sleeve. For installations requiring flush mounting, angle rings may be mounted facing into the opening. Ends of rings can be welded or unwelded. Mounting angle rings are typically supplied by others.
- Caulking:** Caulk shall be one of the following: Dow Corning RTV732, Silco Sil-Bond RTV 4500, General Electric IS808, or Novagard RTV300. Caulking is allowed between the retaining angles and the damper sleeve, and between the face of the floor or wall construction. Caulking is not allowed between the damper sleeve and the wall or floor inside the opening.
- Duct Connections:** All connecting ducts shall not be continuous, but shall terminate at the fire damper sleeve. Duct connections can be rigid or a 4" Drawband connection can be used. For rigid type duct connections, the sleeve shall be a minimum of 16-GA. Duct connections shall conform to SMACNA or ASHRAE duct standards.

STANDARD INSTALLATION CONT.

9. **Maintenance:** Dampers shall be maintained at intervals as stated in NFPA 90A and 92A. Local codes or building conditions may require more frequent inspections and maintenance. A duct access door is to be located on one side of each damper for periodic inspection and maintenance.



ALTERNATE INSTALLATION

(Round Curtain Fire Damper in Square Framed Opening)

1. **General:** These instructions illustrate the approved method of mounting the R19 round curtain fire damper into a square or rectangular framed opening incorporating a retaining plate on only one side of the opening. The installation of the damper and all duct connections to the damper sleeve shall conform to NFPA-90A and the SMACNA Fire, Smoke and Radiation Damper Installation Guide. All duct connections shall also conform to UL555.

This installation is approved for use when all of the following conditions are met:

- The damper is mounted vertically in a rated wall assembly.
- The wall is rated for less than 3 hours.
- The maximum damper size is 14" diameter.
- The wall framing must be masonry/concrete or steel.
- The closed blades must be within the fire rated barrier.

Note: The retaining plate can be on both sides of the opening but is only required on one side.

2. **Multiple Panel / Multiple Section Assembly:** Not available.
3. **Sleeves:** Sleeves are required for the proper installation of fire rated dampers, but need not be factory mounted. Sleeves shall be the same gauge or heavier as the duct to which it is attached. Gauges shall conform to SMACNA or ASHRAE duct standards. A field supplied sleeve is attached to the damper with $\frac{3}{16}$ " diameter steel rivets, $\frac{1}{4}$ " diameter steel bolts, #10 steel sheet metal screws, or $\frac{1}{2}$ " long welds. Fasteners shall be staggered on each side of the damper frame on 8" maximum centers. The sleeve shall not extend more than 6" beyond the fire barrier unless the sleeve includes an access door. If the sleeve includes an access door, the sleeve may extend up to a maximum of 16" beyond the fire barrier.
4. **Expansion Clearance:** The opening in the wall for the fire rated damper shall be sized to provide expansion between the sleeve and the opening. The clearance between the opening frame and the outside of the damper assembly must be between $\frac{1}{4}$ " and 2" total. The damper can be located anywhere in the opening and need not be centered. The retaining plate must still overlap head framing on all sides by at least 1".

Example: A 10" diameter damper is to have a framed opening at least 10.25" and a maximum opening of 12". The damper can rest on the sill of the opening with all of the expansion clearance at the top of the opening.

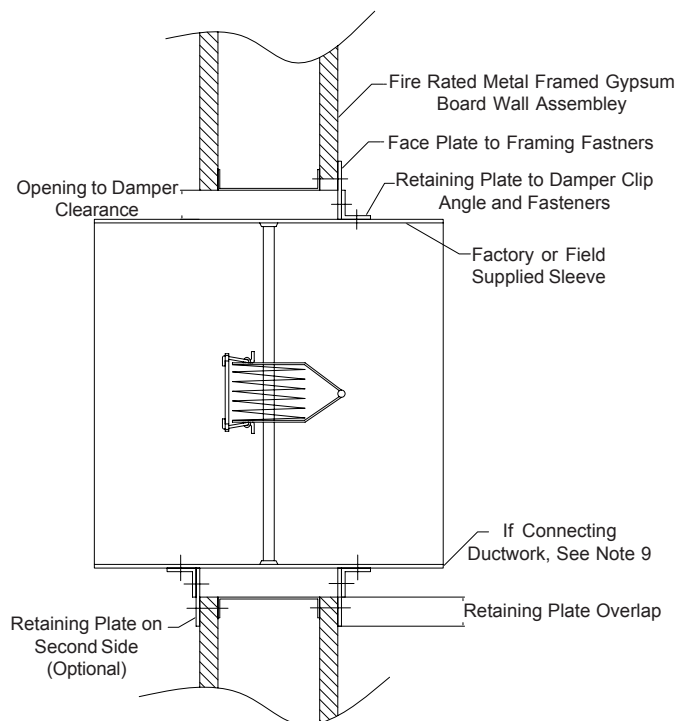
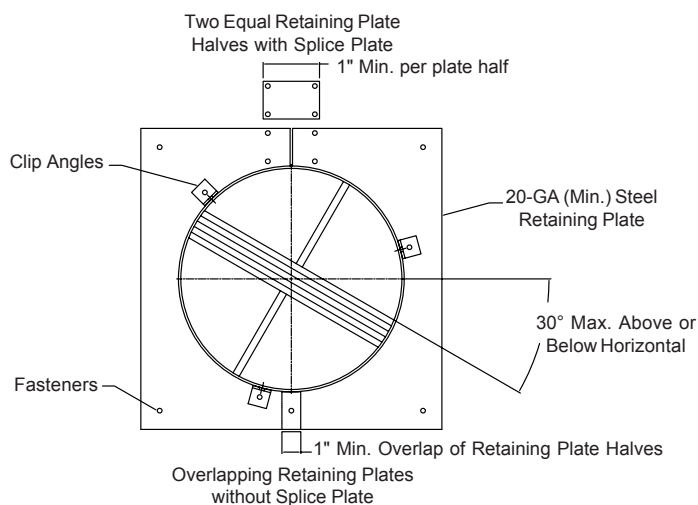


ALTERNATE INSTALLATION CONT. (Round Curtain Fire Damper in Square Framed Opening)

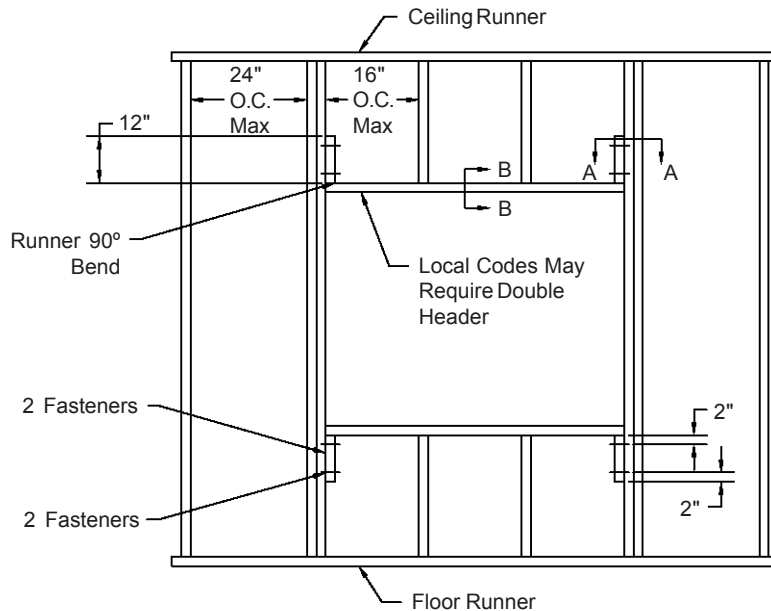
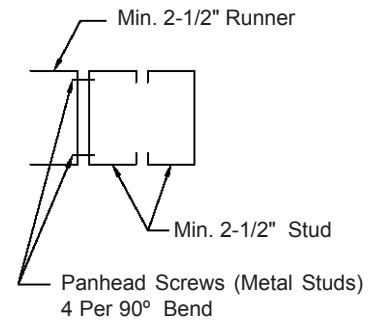
5. **Damper Orientation:** Damper blades should be as horizontal as possible but can be as much as 30° above or below the horizontal. The damper can be positioned so that airflow is from either direction. Blade locks must always be positioned towards the access door. Blade locks are only included in sizes 13" and 14" diameter.
6. **Retaining Plate:** The retaining plate must be a minimum of 20-GA galvanized steel. The plate must overlay the wall framing by a minimum of 1" on each side such that the retaining plate attachment screws fasten into the wall framing. A minimum of 6 fasteners are required, one in each corner and one at each retaining plate splice. In masonry/concrete constructions, $\frac{3}{16}$ " diameter "tapcon" or equal fasteners with a minimum of 1" penetration are required. In metal framed openings, fine thread drywall screws with a minimum of 1" penetration into the framing are required.

Retaining plate halves must be attached using one of the following methods:

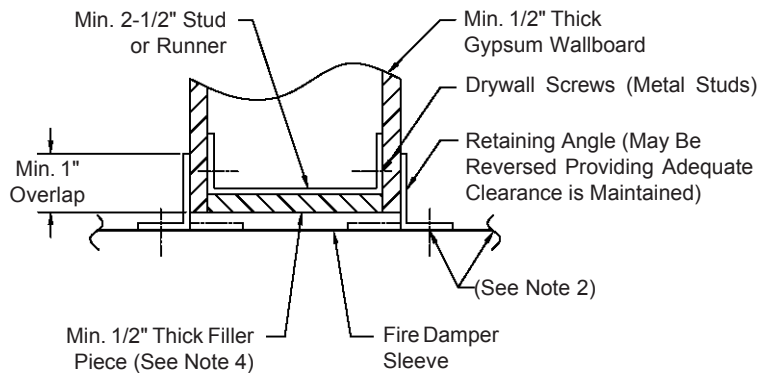
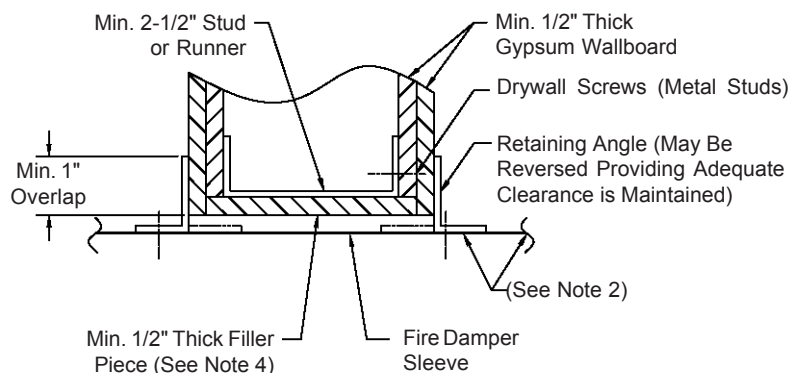
1. The plate halves overlap a minimum of 1" and are fastened directly to one another. A minimum of 1 #10 steel or stainless steel sheet metal screw fastener at each end is required.
 2. The plate halves are joined by a splice plate, so that it overlaps each half a minimum of 1". A minimum of 2 #10 steel or stainless steel sheet metal screw fasteners per plate at each end are required.
7. **Clip Angles:** A minimum of three equally spaced 1" x 1" x 20-GA steel clip angles $\frac{1}{2}$ " long connect the damper to the retaining plate. Fasteners used to mount the damper to the plate must be a minimum #10 steel. Fasteners must not interfere with blade closure.
 8. **Caulking:** Caulk shall be one of the following: Dow Corning RTV732, Silco Sil-Bond RTV 4500, General Electric IS808, or Novagard RTV300. Caulking is allowed between the retaining plate and the damper sleeve, and between the face of the wall construction. Caulking is not allowed between the damper sleeve and the wall inside the opening.
 9. **Duct Connections:** All connecting ducts shall not be continuous, but shall terminate at the fire damper sleeve. Duct connections can be rigid or a 4" Drawband connection can be used. For rigid type duct connections, the sleeve shall be a minimum of 16-GA. Duct connections shall conform to SMACNA or ASHRAE duct standards.
 10. **Maintenance:** Dampers shall be maintained at intervals as stated in NFPA 90A and 92A. Local codes or building conditions may require more frequent inspections and maintenance. A duct access door is to be located on one side of each damper for periodic inspection and maintenance.



FRAMING DETAILS (METAL 1 HOUR AND 2 HOUR RATED BARRIERS)

**Section A-A****NOTES:**

1. These illustrated partition designs have successfully been tested in conjunction with 1-1/2 hour classified fire dampers, for additional designs, reference Underwriters Laboratories, Inc. Fire Resistance Directory. Specific framing requirements of openings may vary with the Local Authority that has jurisdiction. Specific framing requirements should be provided in the architectural and structural drawings.
2. Reference the damper's installation instructions regarding the approved method of attaching the damper to the sleeve, attaching the retaining angles to the sleeve, required expansion clearances, sleeve gauge, etc. Type of framing does not affect the stated required expansion clearance.
3. Gypsum panels surrounding the opening are to be fastened to all stud and runner flanges, 12" o.c. maximum.
4. Filler pieces are optional when metal studs are used (consult local codes to determine if filler pieces are required). Filler pieces are to be double screwed on 12" max. centers to the web of runners and studs.
5. Double jamb studding shown. Single jamb studding acceptable through maximum opening size allowed for this product.

Section B-B
(1 Hour Rated Fire Barrier)**Section B-B**
(2 Hour Rated Fire Barrier)

Standard Installation

Ceiling Radiation Dampers Models: 289, 291, 293, 295, 297

APPLICATION

These ceiling radiation dampers provide the required heat radiation protection of HVAC membrane penetrations (not through penetrations) of rated floor-ceiling and roof-ceiling assemblies. These dampers are normally mounted above steel grilles or diffusers. These UL Classified ceiling dampers can be used in any floor-ceiling or roof-ceiling design that is approved to use a hinged door type damper over an HVAC penetration - consult Underwriters Laboratories Fire Resistance Directory (FRD) for detailed information pertaining to each specific design.

PANEL SIZE LIMITATIONS

Orientation		Horizontal
Assembly		Max Panel
Model	289	100 sq. in. 18"W 10"H
	291	18"W x 18"H
	293	24"W x 24"H
	295	10" dia.
	297	20" dia.

SUPPLEMENTAL INSTALLATION INSTRUCTIONS/SUBMITTAL DATA

Thermal Blankets

RATINGS/APPROVALS

- A. Approved for use in duct drop or ductless installations.
- B. Approved for use in restrained or unrestrained assemblies rated at 2 hours or less.
- C. Tested in accordance to and complies with the requirements of UL Standard 555C.
- D. CSFM Listed, 3226-1328:105.
- E. NYC, MEA #110-99-M.
- F. These dampers are eligible to be installed as a substitute in assemblies shown with hinge door type dampers with exposed or concealed grid suspension systems and in "hard" ceilings of gypsum wallboard or plaster.
- G. These dampers are eligible to be installed in the following wood joist assembly UL Designs: L005, L201, L202, L206, L210, L211 and L212.

LIMITATIONS

- A. UL classification does not cover these dampers for general installation in any floor or ceiling design. These dampers are intended for use only in those UL fire resistive designs that indicate the use of the hinged door type damper.
- B. UL certification does not include the use of these dampers to limit the migration of smoke.
- C. These dampers are not tested to close against airflow.
- D. The size of the duct outlet shall be no larger than the maximum size of the damper.

INSTALLATION

1. **General:** Three specific types of installations will be detailed. The general installation requirements listed below pertain to all three of these specific installations.
 - A. Dampers mounted into and supported by the ceiling grid system (Lay-In) - See Figures 1 and 2.
 - B. Dampers mounted to and supported by the ductwork (Surface Mount) - See Figures 3 and 4.
 - C. Dampers supported by the structure above (Surface Mount) - See Figures 5 and 6.
2. **Blades:** The ceiling dampers are shipped with the blades in the closed position. During installation the blades must be manually opened and the free end of the fuse link attached to the adjacent blade.
3. **Sleeve:** Installations that require an extended upper frame to protect the damper blades from interference during closing may have a field provided sleeve. This sleeve is to be attached to the damper frame in the same manner as required for the duct drop to the damper frame.
4. **Ducts:** Duct outlets should be located in the field of an acoustical panel; however, where it is necessary to cut a main runner or cross tee, a vertical #12 SWG hanger wire shall support each cut end. A $\frac{1}{2}$ " clearance shall be maintained between the duct outlet and each cut end of a main runner or cross tee. The duct outlet shall be located so that no more than one main runner or cross tee is cut per opening. Class 0 or Class 1 flexible air ducts or air ducts bearing the UL listing mark may be used. A steel strap or #16 SWG wire shall be used to connect the flex air duct to the damper assembly. The flexible duct shall be supported on 6' centers maximum with steel straps and/or #12 SWG steel hanger wire and shall be at least 4" above the top of the ceiling membrane.
5. **Hanger Wires:** Hanger wires shall be a minimum of #12 SWG for all damper supports, installed vertically and not splayed. Hanger wires are to be directly connected to the structural members of the floor or roof about the dampers. A minimum of four wires, one at each corner, are required for square and rectangular dampers/duct drops. A minimum of three wires equally spaced are required for round dampers/duct drops.
6. **Clearance:** A maximum of $\frac{1}{8}$ " on each side ($\frac{1}{4}$ " total) clearance may exist between the ceiling damper and the tee bars of a grid support or between the ceiling damper and the duct drop.
7. **Location:** The distance between the exposed surface of the ceiling and the lower surface of the damper blades shall not exceed 5" in any type of installation.
8. **Connections:** The grille or diffuser is mounted to the duct drop or ceiling damper using a minimum #8 steel sheet metal screws, $\frac{3}{16}$ " diameter steel rivets, $\frac{1}{4}$ " tack welds. Screws and rivets shall be located a minimum of $\frac{3}{16}$ " from the edge of the grill/diffuser, ceiling damper or duct drop. Spacing of fasteners shall be at least three equally spaced for round diffusers and 8" on center maximum per side for square/rectangular diffusers with at least one fastener on each side. Grille/diffuser to overlap the ceiling damper or duct drop by a minimum of $\frac{9}{16}$ ".

Ceiling damper-to-duct drop method of attachment and overlap shall be identical to instructions to mount the grille or diffuser to the duct drop.

The ceiling damper and the grille/diffuser can be individually connected to the duct drop, or the grille/diffuser can be attached to the ceiling damper and that assembly attached to the duct drop.

The mounting fasteners must not interfere with the operation of the damper blades.
9. **Thermal Blankets:** In order to maintain the UL rating of ceiling assemblies that utilize a sloped or tapered top diffuser/grille or when the opening in the ceiling membrane is more than 1" larger than the ceiling damper, a thermal blanket is required. The thermal blanket shall be a minimum of $\frac{1}{4}$ " thick ceramic fiber material with a density of 8 lbs./cu.ft. This blanket shall insulate the exterior area of the diffuser/grille and up to the plane of the damper blades. The thermal blanket is retained by #16 SWG steel wire.
10. **Grille/Diffuser:** The frame of the grille and the frame and top pan of the diffuser are to be of steel, the core can be of materials other than steel.
11. **Opposed Blade Dampers:** Opposed blade dampers may be utilized in any ceiling damper installation. The opposed blade damper may be installed into any ceiling damper with an extended lower frame or directly to the duct drop below the damper. No installation shall exceed the 5" distance allowed between the exposed surface of the ceiling and the lower surface of the damper blades.
12. **Ceiling:** For actual ceiling construction, refer to details for a particular design in the UL Fire Resistance Directory (FRD).

Ceiling Damper Supported by a Grid System (Lay-In)

The ceiling damper in this type of installation is supported by the ceiling grid (normally steel T-Bar). The ceiling damper can fill the opening and rests directly on the grid system (See Figure 1) or the ceiling damper mounts onto the reduced neck of a lay-in diffuser that rests directly on the grid system (See Figure 2). The grid system opening can be as large as 24"W x 24"H.

Figure 1 - Ceiling Damper That Fills Grid Opening

Shown unducted; can also be ducted

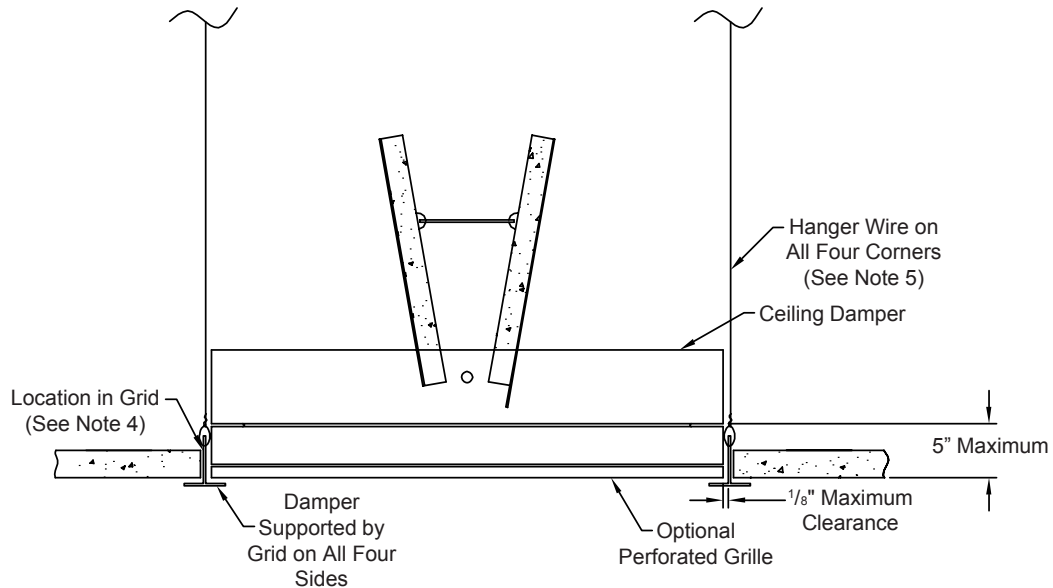
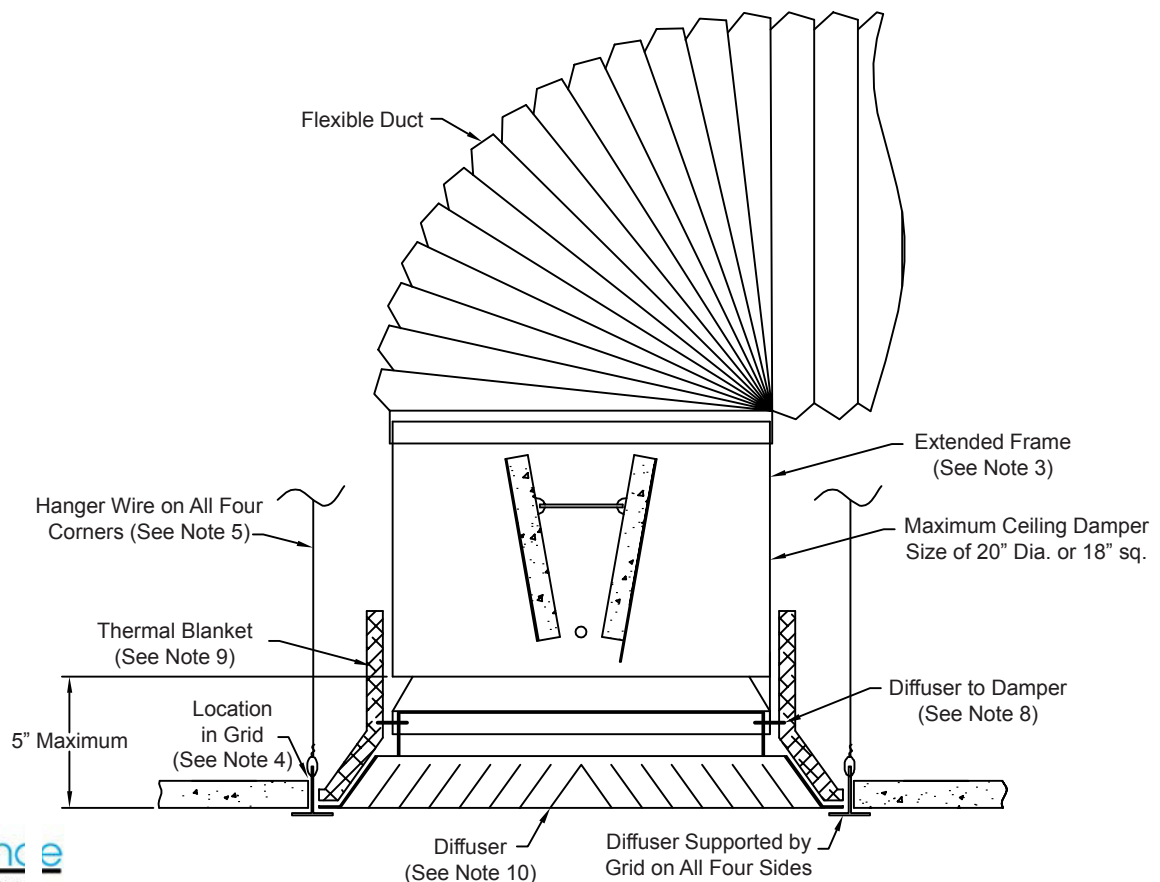


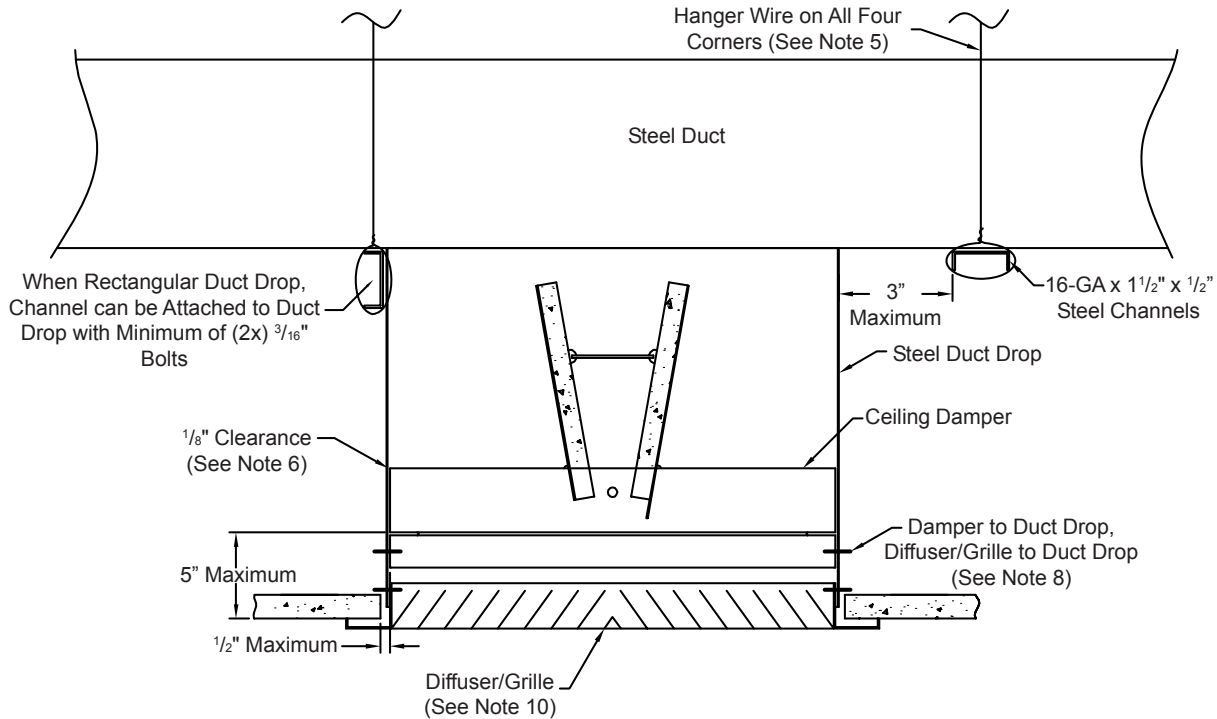
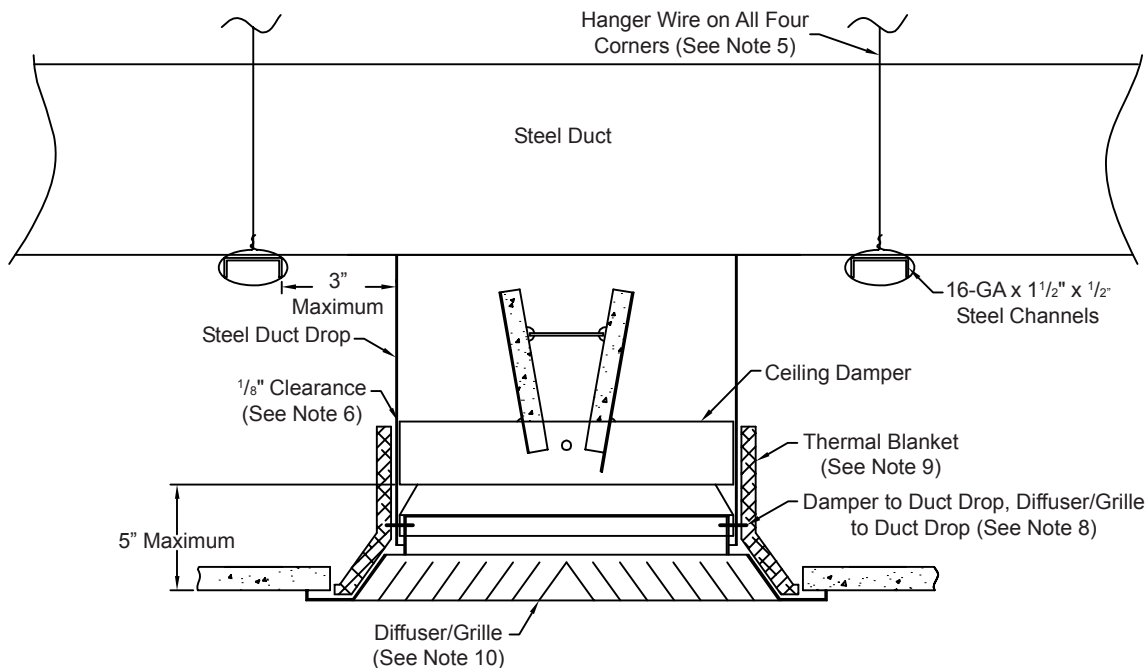
Figure 2 - Ceiling Damper on Neck of Diffuser

Shown with flex duct; can also be connected to a steel duct drop or unducted



Ceiling Damper Supported by Ductwork (Surface Mount)

The main duct above the damper supports the ceiling damper in this type of installation. The ceiling damper can fill the ceiling opening (See Figure 3) or the ceiling damper mounts onto the reduced neck of a surface mounted diffuser (See Figure 4). The opening can be as large as 24"W x 24"H. The steel flange (minimum of 1") of the diffuser or grille is to overlap and support the bottom surface of the ceiling membrane.

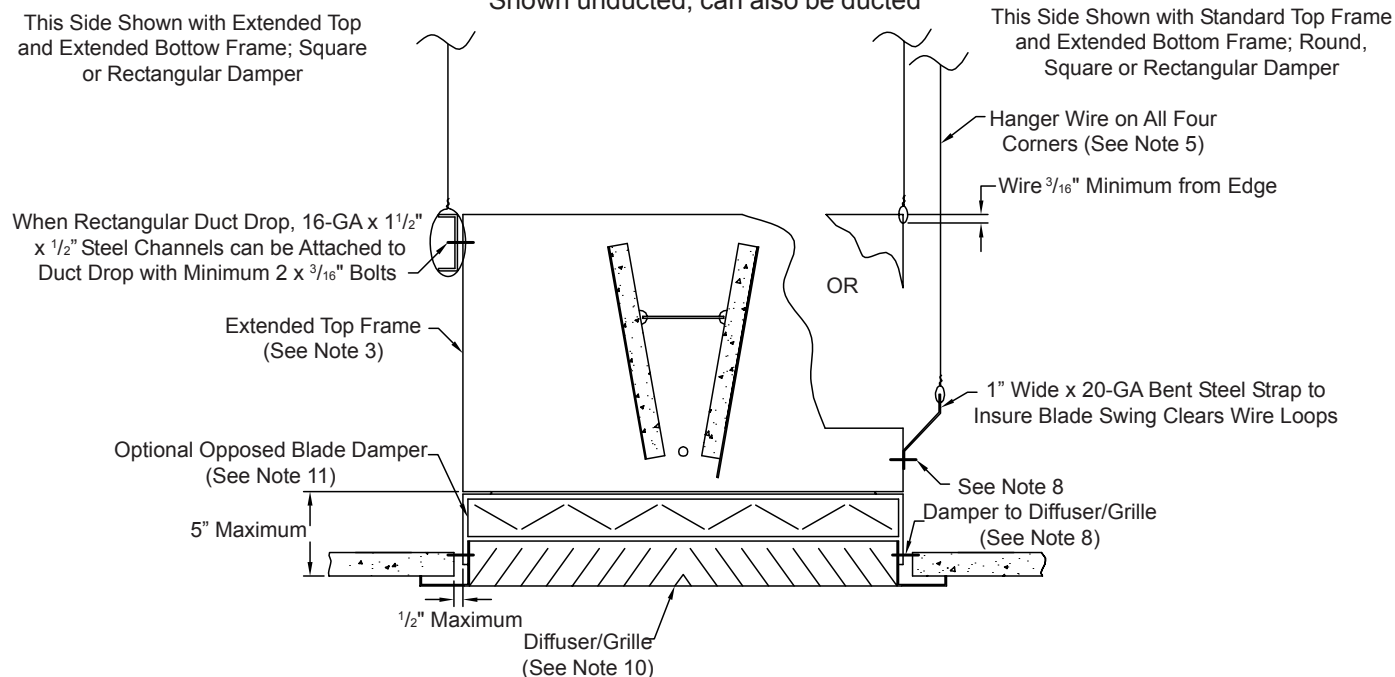
Figure 3 - Ceiling Damper that Fills Ceiling Opening**Figure 4 - Ceiling Damper on Neck of Diffuser**

Ceiling Damper Supported by Structure (Surface Mount)

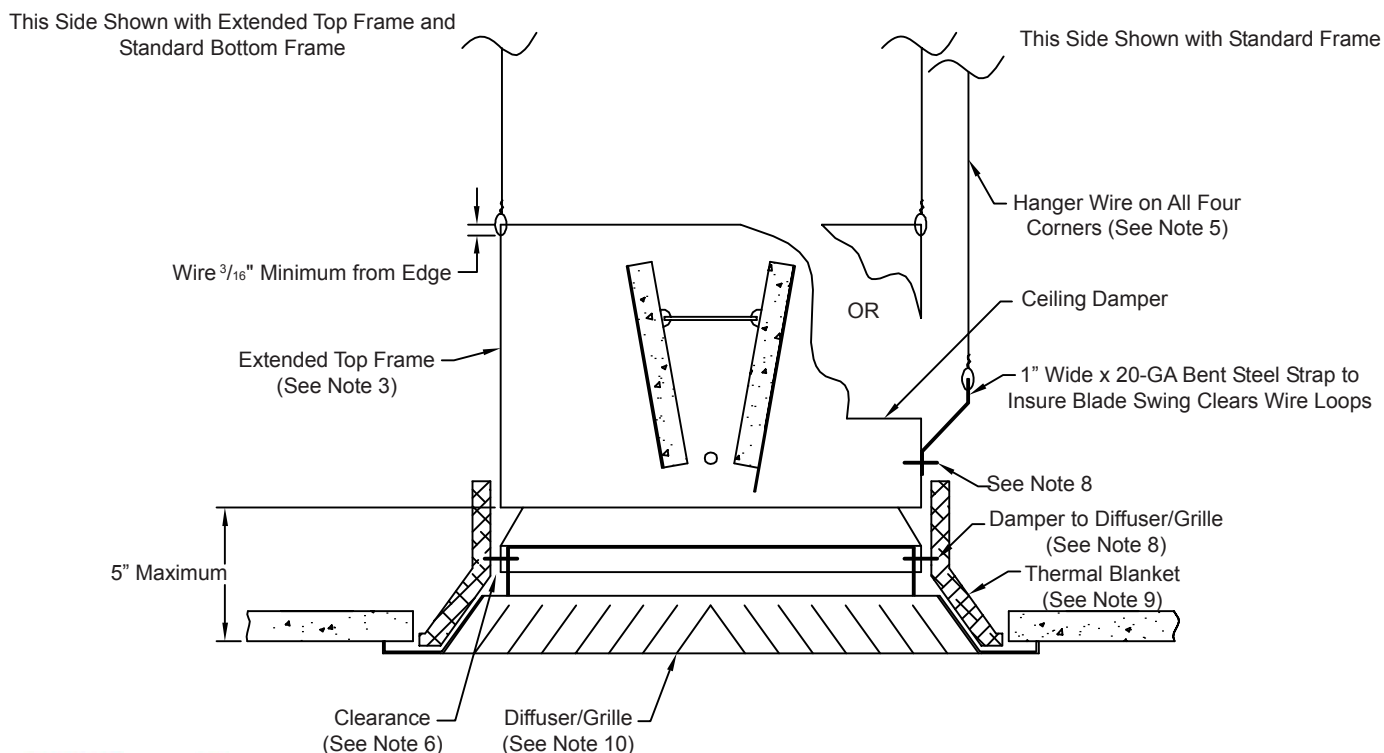
The ceiling damper in this type of installation is supported by the floor or roof structure above the damper. The ceiling damper can fill the ceiling opening (See Figure 5) or the ceiling damper mounts onto the reduced neck of a surface mounted diffuser (See Figure 6). The opening can be as large as 24"W x 24"H. The steel flange (minimum of 1") of the diffuser or grille is to overlap and support the bottom surface of the ceiling membrane

Figure 5 - Ceiling Damper that Fills Ceiling Opening

Shown unducted; can also be ducted

**Figure 6 - Ceiling Damper on Neck of Diffuser**

Shown unducted; can also be connected to a steel duct drop or flexible duct



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Standard Installation

Fire Damper Model: RF

Fire/Smoke Damper Model: RC

Smoke Damper Model: RS

APPLICATION

Damper Models RC and RF are round, single blade, dynamically rated combination fire/smoke and fire dampers are intended to restrict the passage of flame and smoke (Model RC) or flame only (Model RF). These dampers are to be mounted such that the closed plane of the damper blade is within the fire barrier. Airflow can be from either direction. When mounted in the vertical position the damper may be mounted right side up or upside down.

Damper Models RC and RF can be mounted horizontally in a round or square masonry/concrete floor opening with its jackshaft/actuator assembly on the topside of the floor. Damper can be mounted vertically in a round or square masonry/concrete wall opening as well as in square metal or wood framed gypsum board wall openings. When mounted vertically, the damper's axle can vary by as much as 30° from the horizontal.

Damper Model RS is a dynamically rated smoke damper that can be mounted horizontally or vertically. Airflow can be from either direction. When mounted in the vertical position the damper may be mounted right side up or upside down. When mounted vertically, the damper's axle can vary as much as 30° from the horizontal. It can be mounted within the plane of the smoke barrier as well as mounted outside of the plane of the smoke barrier. When mounted outside of the plane of the smoke barrier it is to be installed within 24" of the barrier and before any duct inlets or outlets.

PANEL SIZE LIMITATIONS

Model	Mounting	Min Diameter	Max Diameter	Ratings
RC	Vertical or Horizontal	6" dia.	24" dia.	1½ Hour, UL555 Rated Leakage Class I, 250°F or 350°F (depending on actuator selected), UL555S Rated
RF	Vertical or Horizontal	8" dia.	24" dia.	1½ Hour, UL555 Rated
RS	Vertical or Horizontal	6" dia.	24" dia.	Leakage Class I, 250°F or 350°F (depending on actuator selected), UL555S Rated

SUPPLEMENTAL INSTALLATION INSTRUCTIONS / SUBMITTAL DATA

Electric or Pneumatic Heat Response Device (SD-EHRD or SD-PHRD)
 Integral Dual Position Indication (SD-IDPI)
 Electric or Pneumatic Sensotherm (SD-ESOT or SD-PSOT)

Standard Installation

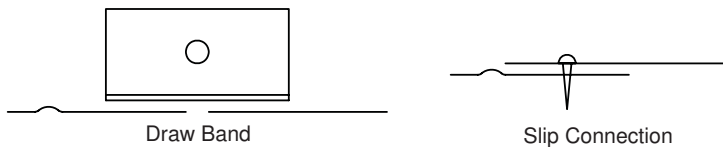
Fire Damper Model: RF
 Fire/Smoke Damper Model: RC
 Smoke Damper Model: RS

INSTALLATION REQUIREMENTS FOR MODEL RC AND RF

1. The 20-GA (minimum) galvanized steel retaining plate can be factory or field supplied, see Figures 4A and 4B for details. Retaining plate(s) to overlap the opening by a minimum of 1.0" on each of the four sides. See Figures 1, 2, and 3 for type of retaining plate-to-opening steel fastener to use.
2. A second retaining plate is optional when mounting into masonry/concrete or metal framed gypsum board constructions. A second retaining plate is required when mounting into wood framed gypsum board construction. When a second retaining plate is used on the non-actuator side, it is attached to the damper sleeve with 1" x 1" x 20-GA by ½ long (minimum) clip angles. Clip angles attached to damper sleeve with a single #10 steel SMS on 14" maximum centers, minimum three equally spaced. No plate-to-face of opening fasteners required for this second plate. Fastener placement must not interfere with damper blade travel.
3. The clearance between the opening and the damper sleeve is to be a minimum of 1" and a maximum of 2.5". Damper can rest on the sill of the opening with all of the expansion clearance at the top of the opening. Regardless of how the damper is positioned in the opening, the retaining plate must overlap the opening by a minimum of 1" on each of the four sides.
4. When vertically mounted, damper axle should be as horizontal as possible but can be as much as 30° above or below the horizontal.
5. Any connecting ducts shall not be continuous and shall terminate at the damper sleeve. Duct connections are made with a 4" wide draw-band connection or #10 SMS. When the duct is attached to the damper sleeve with SMS; 3 equally spaced screws for 22" and smaller diameters, 5 equally spaced screws for larger diameters. See Note 1 below. If the duct to damper sleeve connection is to be caulked, use either Design Polymeric's DP1010 or Precision's PA2084T.
6. The damper sleeve shall not extend more than 6" beyond the fire barrier on the non-actuator/jackshaft side nor more than 16" on the actuator/jackshaft side.
7. When mounted horizontally in a floor, actuator/jackshaft to be on the topside.
8. Dampers shall be maintained at intervals stated in NFPA 90S and 92A. Local codes or building conditions may require more frequent inspections and maintenance. A duct access door is to be located on the jackshaft side of each damper for periodic inspection and maintenance.

NOTES

1. Damper can also be connected to ductwork using draw band or slip connection.

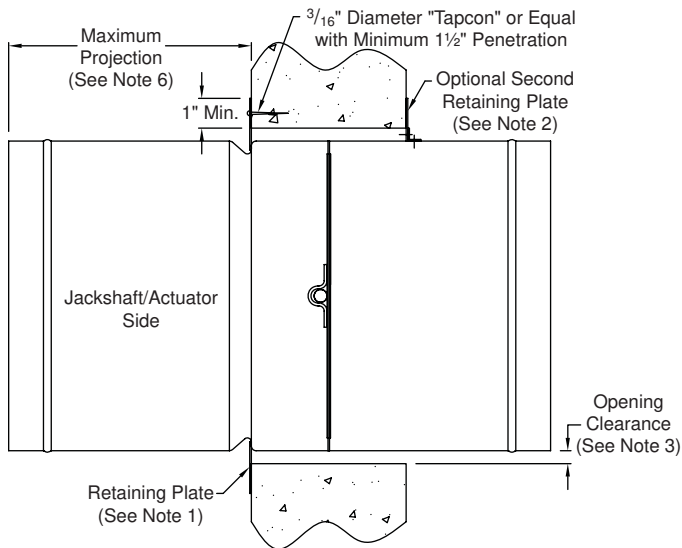


Standard Installation

Fire Damper Model: RF
Fire/Smoke Damper Model: RC
Smoke Damper Model: RS

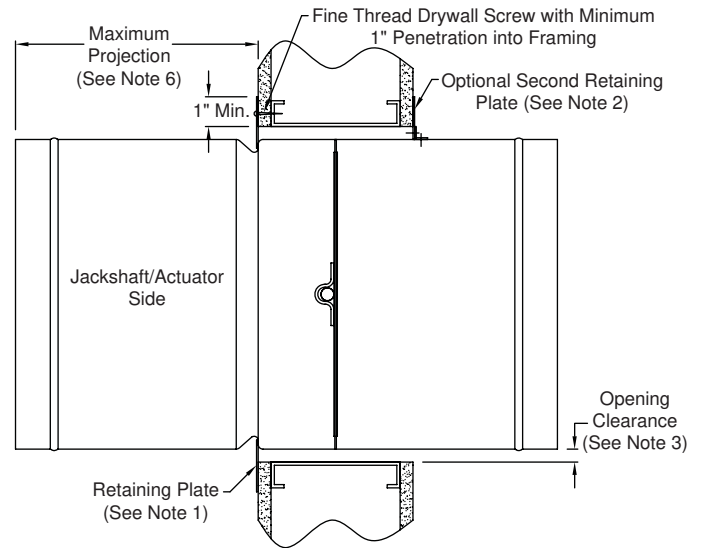
Mounting in Round or Square, Masonry/Concrete

Figure 1



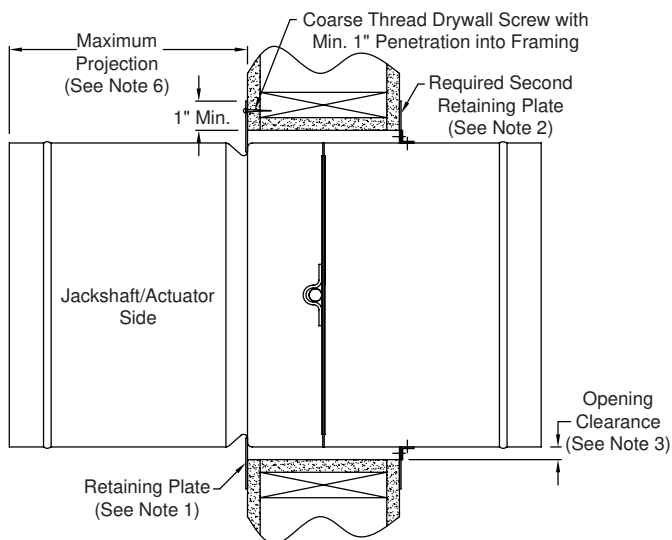
Mounting in Square, Metal-Framed Gypsum Board

Figure 2



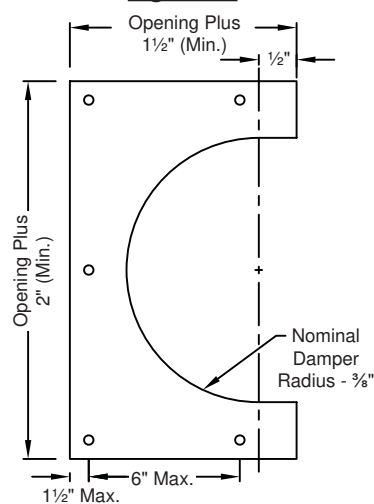
Mounting in Square, Wood-Framed Gypsum Board

Figure 3



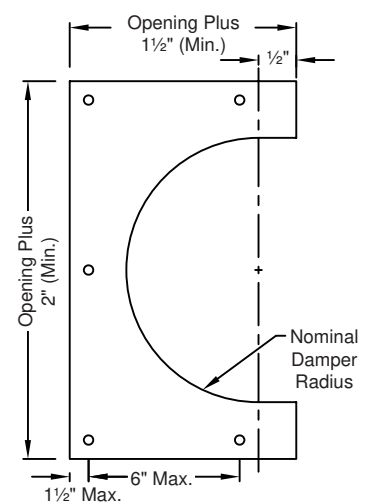
Damper Retaining Plates

Figure 4A



Actuator Side Plate
- Two Halves Required
- 20-GA Galvanized Steel
- Nests into Frame Groove

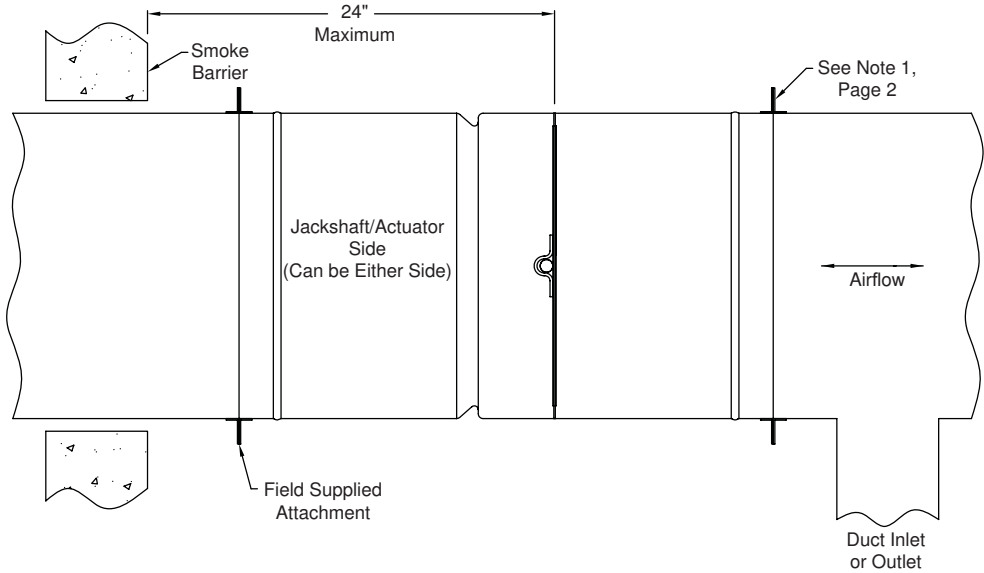
Figure 4B



Non-Actuator Side Plate
- Two Halves Required
- 20-GA Galvanized Steel
- Slides Over Frame

Standard Installation
Fire Damper Model: RF
Fire/Smoke Damper Model: RC
Smoke Damper Model: RS

Smoke Only, Vertical or Horizontal
Figure 5

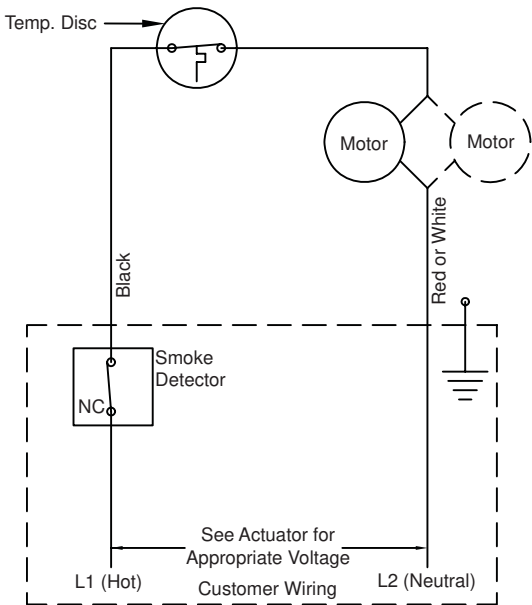


ELECTRIC WIRING SCHEMATICS

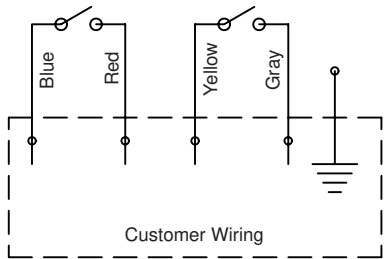
Notes

- 1. All wiring to be in accordance with N.E.C. (NFPA 70).
- 2. Refer to actuator label for appropriate voltage.
- 3. Connect incoming ground to the actuator assembly.
- 4. If the actuator remains electrically energized, yet the damper remains in the closed position, check to ensure that the reset button on the heat response device is depressed.

Electric Heat Response Device (EHRD)
Figure 6A



Integral Dual Position Indication (IDPI)
Figure 6B



Integral Dual position Indication (IDPI) Wiring Chart			
Actuator Mounting Location	Damper Full Open	Damper Full Close	Damper Mid-Stroke
	Closed Circuit		
External Left	Red/Blue	Yellow/Gray	None
External Right	Yellow/Gray	Red/Blue	None

*This wiring is opposite if the actuator is rotated 90°, so that it is parallel to the duct.

Standard Installation

Fire Damper Model: RF

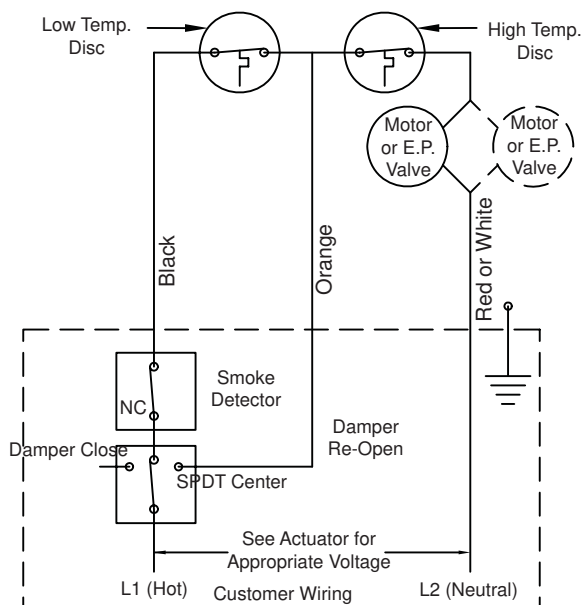
Fire/Smoke Damper Model: RC

Smoke Damper Model: RS

ELECTRIC WIRING SCHEMATICS (CONT.)

Electric/Pneumatic Sensotherm (ESOT/PSOT) with included Integral Dual Position Indication (IDPD)

Figure 6C



ESOT/PSOT Wiring, Test, and Operating Instructions

Damper is supplied with one low temperature thermal disc and one high temperature thermal disc. All dampers require a control switch (supplied by others) for re-openable operation.

Customer Wiring

1. Connect input power lead L1 from the normal closed position lead of the (MCS) switch to damper lead L1.
Note: If a smoke detector or other sensing device is to be employed, its NC contact set should be wired in series between the (MCS) position switch normal wire and lead L1.
2. Connect incoming lead L2 to damper lead L2.
3. Connect the reopen switch lead from (MCS) to orange damper lead.
4. Connect the incoming ground lead to the wiring enclosure.
5. Install IDPI (if used) per the schematic.
6. Replace enclosure cover.

Circuit Test

1. Place (MCS) switch in damper close position.
2. Apply power.
Result: The closed indicator light (if used) should be on and the damper blades closed.
3. Transfer (MCS) switch to damper re-open position.
Result: The damper blades should open; the closed indicator light (if used) should go off and the open indicator light (if used) should go on.
4. Transfer (MCS) switch to the normal position.
Result: The damper blades should remain open and the open indicator light (if used) should remain on.
5. Transfer the (MCS) switch to the closed position.
Result: The damper blades should close; the open indicator light (if used) should go off and the closed indicator light (if used) should go on.

Emergency Operation (Smoke Management)

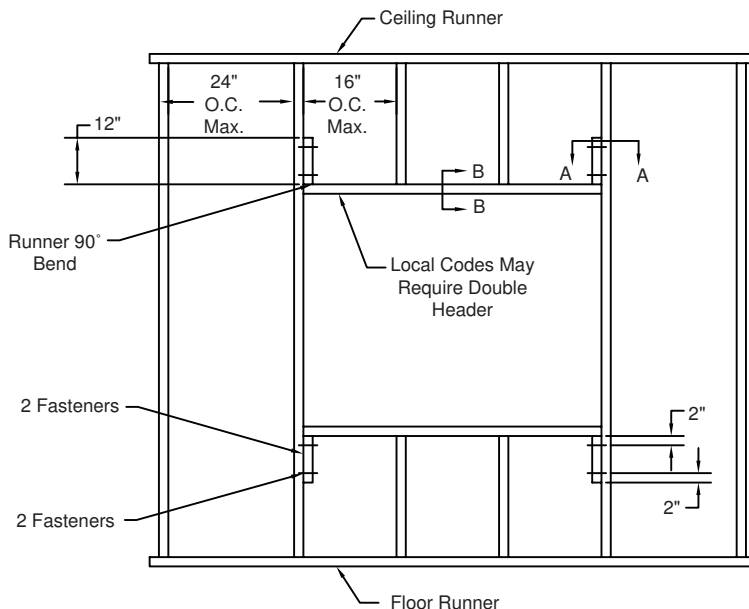
1. MCS Closed Position: Damper will close regardless of whether the thermal switch device has activated or not and regardless of the command for the smoke system.
2. MCS Re-Open Position: If the damper has not been exposed to an elevated temperature higher than its rating, the damper will open. Also, the damper will open regardless of whether the low temperature thermal disc (165°F or 212°F) has activated or not and regardless of a command from additional sensing devices, such as a smoke detector.

Note: If the master control switch (MCS) is in the re-open position and the high temperature thermal disc has not been tripped, the damper will remain open regardless of whether the low temperature thermal disc and/or other sensing devices have tripped or not. If the damper has been exposed to an elevated temperature higher than its temperature degradation rating, or if the electrical or pneumatic supply has been disconnected, the damper will close and remain closed regardless of any (MCS) position.

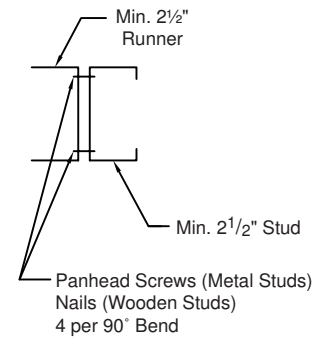
Standard Installation

Fire Damper Model: RF
 Fire/Smoke Damper Model: RC
 Smoke Damper Model: RS

UL CLASSIFIED FIRE DAMPERS INSTALLED INTO METAL OR WOOD FRAMED 1 HOUR AND 2 HOUR RATED DRYWALL PARTITIONS



Section A-A

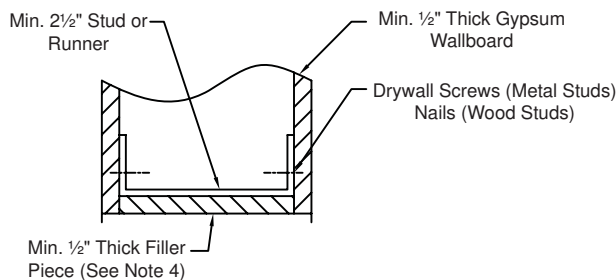


NOTES:

1. These illustrated partition designs have successfully been tested in conjunction with 1½ hour classified fire dampers, for additional designs, reference Underwriters Laboratories, Inc. Fire Resistance Directory. Specific framing requirements of openings may vary with the Local Authority that has jurisdiction. Specific framing requirements should be provided in the architectural and structural drawings.
2. Reference the damper's installation instructions regarding the approved method of attaching the retaining angles/mounting plates, required expansion clearances, etc. Type of framing does not affect the stated required expansion clearance.
3. Gypsum panels surrounding the opening are to be fastened to all stud and runner flanges, 12" o.c. maximum.
4. When wooden studs are used, filler pieces must be installed around the entire opening. Filler pieces are optional when metal studs are used (consult local codes to determine if filler pieces are required). Filler pieces are to be double screwed (or nailed to wooden studs) on 12" maximum centers to the web of runners and studs.
5. Some jurisdictions require filler pieces around both wood and metal framed openings (no filler pieces around concrete or masonry openings). These codes may also require a double header for wood framed openings, consult local code authorities.

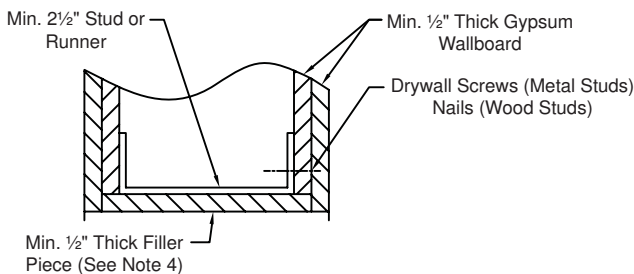
Section B-B

(1 Hour Rated Fire Barrier)



Section B-B

(2 Hour Rated Fire Barrier)



Standard Installation

Fire/Smoke Damper Models: FR1, FR2

Smoke Damper Models: SR1, SR2

APPLICATION

These dynamically rated fire/smoke and smoke dampers are intended to restrict the passage of smoke. The dynamically rated fire/smoke dampers are also intended to restrict the passage of fire. When the damper is intended to be used as a fire rated damper, the standard installation requires that the damper is positioned so that the closed plane of the blades is within the fire rated masonry/concrete or metal or wood framed gypsum wallboard barrier. When the damper is to be used as a leakage rated damper only, the damper is to be installed within 24" of the smoke barrier and upstream of any duct inlets or outlets.

The fire/smoke damper may be mounted in the vertical or horizontal position with the damper blades running horizontally. Air flow can be from either direction. When mounted in the vertical position, the damper may be mounted right side up or upside down and can be mounted in a fire barrier constructed of masonry/concrete or metal or wood framed gypsum wallboard materials. When mounted in the horizontal position, the damper must be mounted with the actuator on the top side of the door and can only be mounted in a fire barrier constructed of masonry/concrete materials.

The smoke damper may be mounted in the vertical or horizontal position with the damper blades running horizontally. Air flow can be from either direction. When mounted in the vertical position, the damper may be mounted right side up or upside down. It can be mounted within the plane of a smoke barrier, but can also be mounted out of the plane of a smoke barrier. When mounted out of the plane of the smoke barrier, it is to be installed within 24" of the barrier and before any duct inlets or outlets.

PANEL SIZE LIMITATIONS

	Actuation	Electric					
	Orientation	Horizontal			Vertical		
	Assembly	Max Panel 250 F	Max Panel 350 F	Multiple Panel	Max Panel 250 F	Max Panel 350 F	Multiple Panel
Model	FR1, FR2	24"W x 24"H	24"W x 24"H	not available	24"W x 24"H	24"W x 24"H	not available
	SR1, SR2	24"W x 24"H	24"W x 24"H	not available	24"W x 24"H	24"W x 24"H	not available

	Actuation	Pneumatic					
	Orientation	Horizontal			Vertical		
	Assembly	Max Panel 250 F	Max Panel 350 F	Multiple Panel	Max Panel 250 F	Max Panel 350 F	Multiple Panel
Model	FR1, FR2	24"W x 24"H	24"W x 24"H	not available	24"W x 24"H	24"W x 24"H	not available
	SR1, SR2	24"W x 24"H	24"W x 24"H	not available	24"W x 24"H	24"W x 24"H	not available

SUPPLEMENTAL INSTALLATION INSTRUCTIONS / SUBMITTAL DATA

Sleeve Extension
 Electric or Pneumatic Heat Response Device (SD-EHRD or SD-PHRD)
 Integral Dual Position Indication (SD-IDPI)
 Electric or Pneumatic Sensotherm (SD-ESOT or SD-PSOT)
 Transition (SD-TRFS)

Standard Installation

Fire/Smoke Damper Models: FR1, FR2

Smoke Damper Models: SR1, SR2

1. General: The installation of the damper and all duct connections to the damper sleeve shall conform to NFPA0-90A and the SMACNA Fire, Smoke and Radiation Damper Installation Guide. All duct connections shall also conform to UL555 when the damper is intended to be used as a fire damper.

2. Actuators: Dampers must be supplied with factory mounted actuators and are intended to close automatically when sensing heat or upon loss of electrical power or release of air pressure. When this damper is used as a leakage rated damper only, it shall be arranged to operate automatically and is to be controlled by a smoke detector. See additional instructions, which detail damper actuator sequence of operations.

3. Multiple Panel / Multiplier Section Assembly: Not available.

4. Sleeves: Sleeves are required for the proper installation of fire rated dampers, and are factory mounted. Sleeves shall be the same gauge or heavier as the duct to which it is attached. Gauges shall conform to SMACNA or ASHRAE duct standards.

5. Expansion Clearance: Expansion clearance is not required for fire rated damper sizes smaller than or equal to 24"W x 24"H and is not required for any leakage-only rated dampers. For all sizes, the opening width and height shall be no more than 1" larger than the damper width and height.

Example: For a damper with exact outside dimensions of 24"W x 24"H, the gap at the top plus the gap at the bottom must be < 1". The gap at the left side plus the gap at the right side must be < 1". The damper can be located anywhere in the opening and need not be centered.

6. One-Side Retaining Angle Attachment: Fire rated dampers are approved for one-side mounting. The factory supplied, field attached retaining angles must be positioned such that the closed plane of the damper blades remain within the wall or floor plane. To ensure a proper installation, the one-side retaining angles are to be located and field attached anywhere between the frame's lanced tabs (also observe label on damper sleeve). To avoid potential interference between the blade travel and the retaining angle fasteners, the factory supplied (or equivalent) fasteners must be used. The retaining angles shall be fastened to all four sides of the damper sleeve on 3" maximum centers. In addition to attaching the retaining angles to the damper sleeve, the retaining angles must also be attached to the face of the wall or floor opening. Attach the retaining angles to the face of the wall or floor opening on 6" maximum centers and 4 1/2" maximum for each corner. Pre-punched holes in the factory supplied retaining angles are not intended for use as a mounting pattern. Depending on type of opening; see A or B or C (below) for type of retaining angle-to-opening fastener.

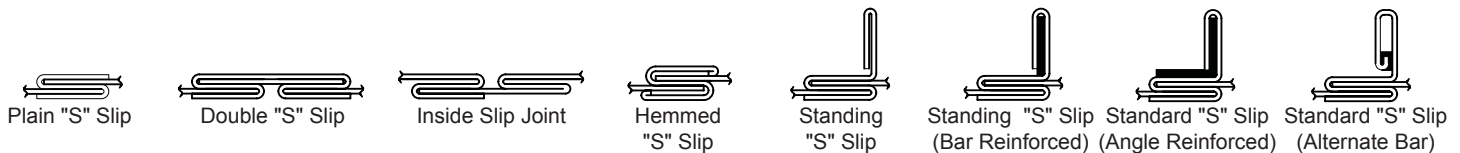
- A. In masonry construction, 3/16" diameter "tapcon" or equal fasteners with a minimum of 1 1/2" penetration are required.
- B. In metal framed openings, fine thread drywall screws with a minimum of 1" penetration into the framing are required.
- C. In wood framed openings, coarse thread drywall screws with a minimum of 1" penetration into the framing are required.

Smoke only rated damper do not require the retaining angles to be attached to the smoke barrier but the retaining angles are to be attached to the damper sleeve as described above.

7. Caulking: Caulk shall be one of the following: Dow Corning RTV732, Silco Sil-Bond RTV 4500, General Electric IS808, or Novagard RTV300. Caulk between the retaining angles and the damper sleeve, and between the retaining angles and the face of the floor or wall construction. Caulking is not allowed between the damper sleeve and the wall or floor inside the opening.

Breakaway angle caulking shall be Design Polymeric's DP1010 or Precision's PA2084T.

8. Duct Connections: All connecting ducts shall not be continuous, but shall terminate at the fire damper sleeve. Duct connections not listed as breakaways shall be considered rigid. Dampers require a breakaway connection. The following breakaway duct-to-sleeve connections may be used: Plain "S" Slip, Inside Slip, Hemmed "S" Slip, Standing "S" Slip (Bar Reinforced), Standing "S" Slip (angle Reinforced), and Standing "S" Slip (Alternate Bar). Breakaway joints shall have no more than two No. 10 sheet metal screw on each side and on the bottom. The screws shall penetrate both sides of the slip pocket. When a breakaway joint is used along the top and bottom duct connections, a flat drive slip no longer than 20" is permitted on the two sides. The factory supplied sleeve is 20-GA galvanized steel and assumes that a breakaway type duct connection will be employed.



The factory supplied round/oval transition provides the breakaway connection if the following conditions are satisfied.

- 1. Round duct diameter is no larger than 22".
- 2. Oval duct size is no larger than 22"W x 22"H.
- 3. Duct gauges conform to the SMACNA or ASHRAE standard.
- 4. An oval duct or round duct less than or equal to 22" is attached to the transition collar with #8 sheet metal screws (a minimum of 4 fasteners per connection).

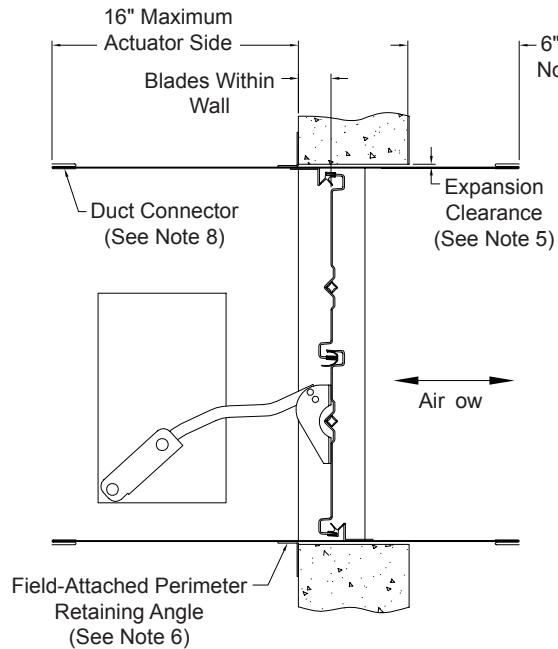
9. Maintenance: Dampers shall be maintained at intervals as stated in NFPA 90A and 92A. Local codes or building conditions may require more frequent inspections and maintenance. A duct access door is to be located on the jackshaft side of each damper for periodic inspection and maintenance.

Standard Installation

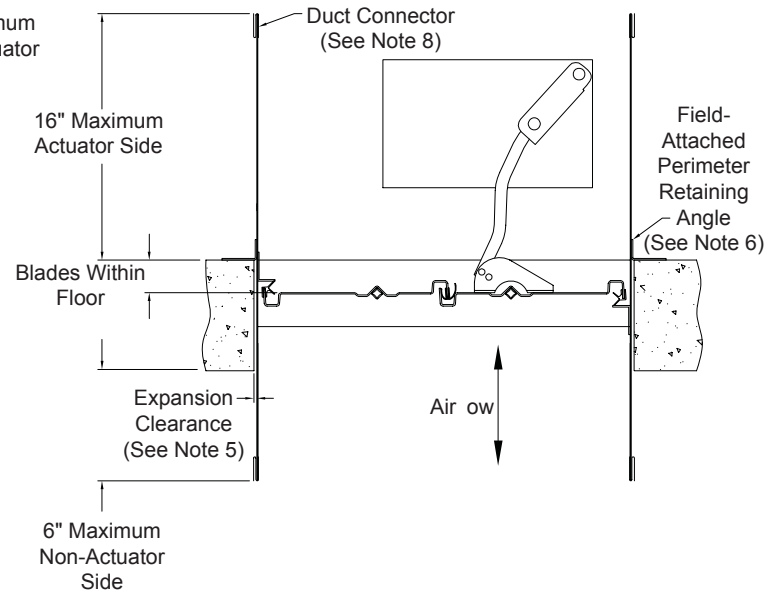
Fire/Smoke Damper Models: FR1, FR2
Smoke Damper Models: SR1, SR2

Fire/Smoke Vertical or Horizontal

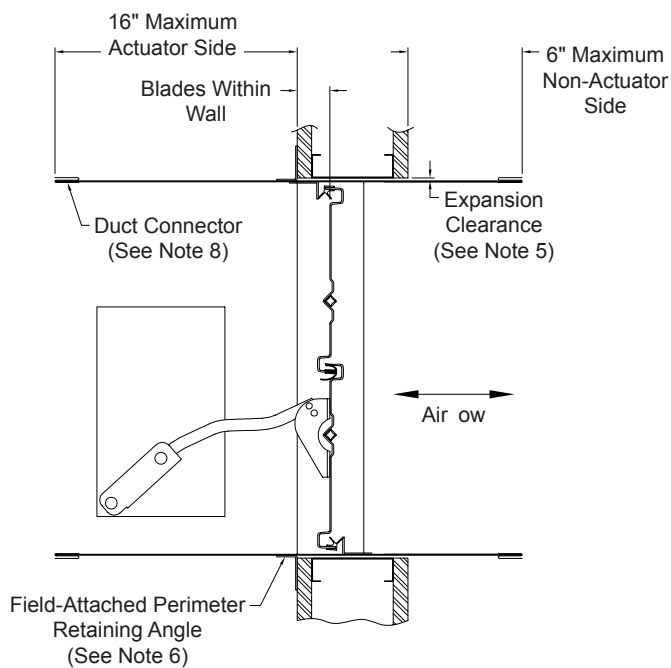
Vertical 1-Side Retaining, Masonry



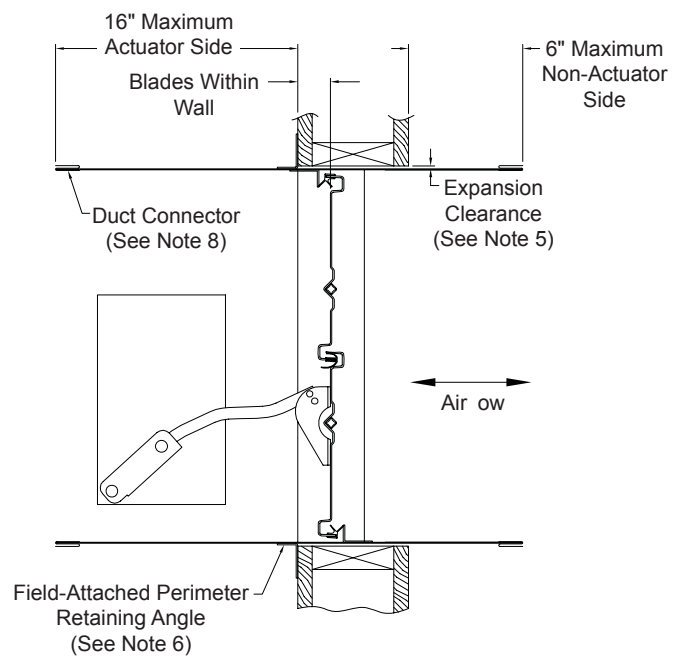
Horizontal 1-Side Retaining, Masonry



Vertical 1-Side Retaining, Metal Stud



Vertical 1-Side Retaining, Wood Stud



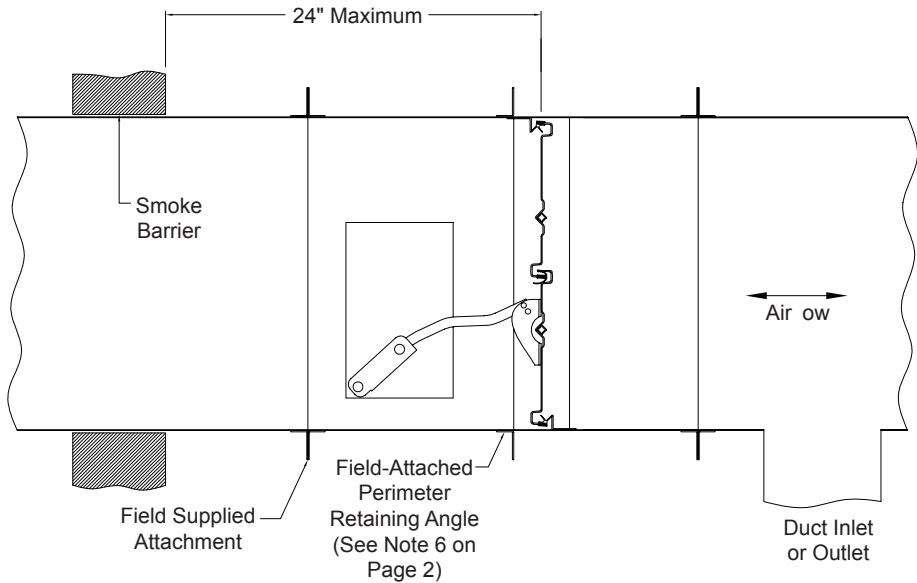
See page 2 of these instructions for reference notes.

Standard Installation

Fire/Smoke Damper Models: FR1, FR2

Smoke Damper Models: SR1, SR2

Smoke Only, Vertical or Horizontal

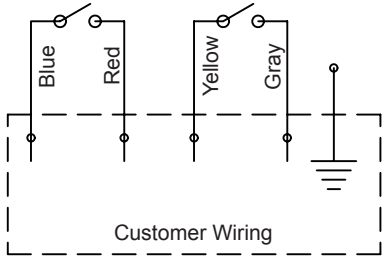
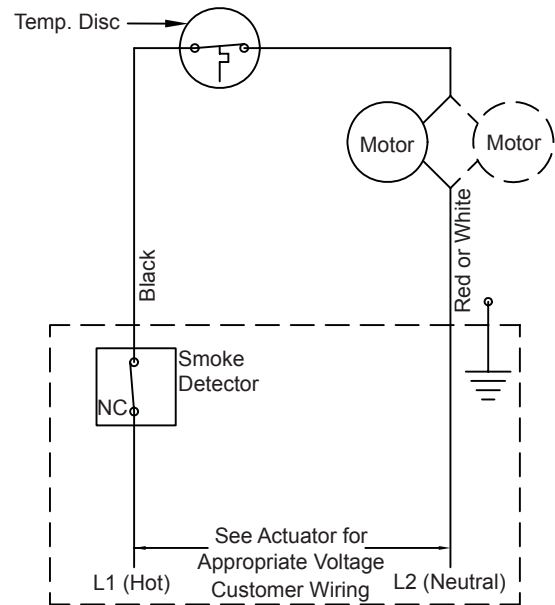


ELECTRIC WIRING SCHEMATICS

- Notes
- 1. All wiring to be in accordance with N.E.C. (NFPA 70).
 - 2. Refer to actuator label for appropriate voltage.
 - 3. Connect incoming ground to the actuator assembly.
 - 4. If the actuator remains electrically energized, yet the damper remains in the closed position, check to ensure that the reset button on the heat response device is depressed.

Electric Heat Response Device (EHRD)
(EHRD, Fire/Smoke Only)

Integral Dual Position Indication (IDPI)



Integral Dual position Indication (IDPI) Wiring Chart			
Actuator Mounting Location	Damper Full Open	Damper Full Close	Damper Mid-Stroke
	Closed Circuit		
External Left	Red/Blue	Yellow/Gray	None
External Right	Yellow/Gray	Red/Blue	None
Internal Left	Yellow/Gray	Red/Blue	None
Internal Right	Red/Blue	Yellow/Gray	None

*This wiring is opposite if the actuator is rotated 90 , so that it is parallel to the duct.

*Temperature disc shown in circuit is present in FR dampers only.

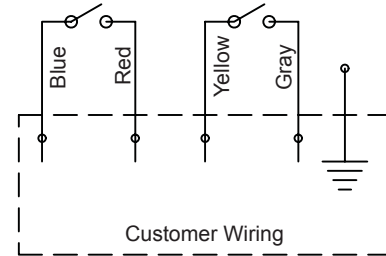
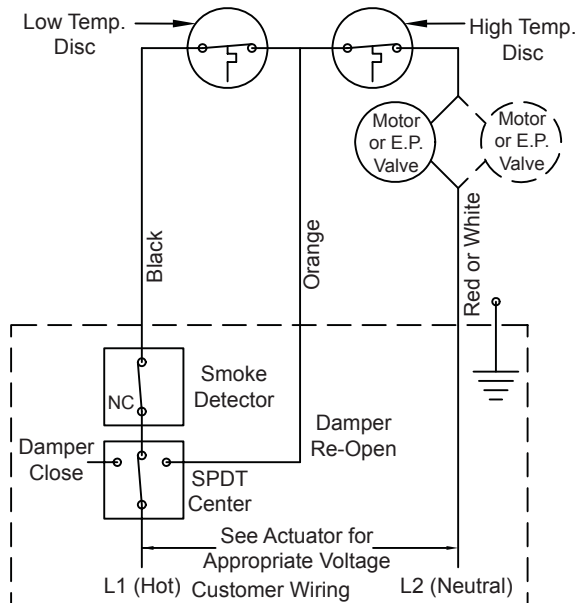
Standard Installation

Fire/Smoke Damper Models: FR1, FR2

Smoke Damper Models: SR1, SR2

ELECTRIC WIRING SCHEMATICS (CONT.)

**Electric/Pneumatic Sensotherm (ESOT/PSOT) with included Integral Dual Position Indication (IDPD)
Fire/Smoke Only**



Integral Dual position Indication (IDPI) Wiring Chart			
Actuator Mounting Location	Damper Full Open	Damper Full Close	Damper Mid-Stroke
	Closed Circuit		
External Left	Red/Blue	Yellow/Gray	None
External Right	Yellow/Gray	Red/Blue	None
Internal Left	Yellow/Gray	Red/Blue	None
Internal Right	Red/Blue	Yellow/Gray	None

*This wiring is opposite if the actuator is rotated 90°, so that it is parallel to the duct.

ESOT/PSOT Wiring, Test, and Operating Instructions

Damper is supplied with one low temperature thermal disc and one high temperature thermal disc. All dampers require a control switch (supplied by others) for re-openable operation.

Customer Wiring

1. Connect input power lead L1 from the normal closed position lead of the (MCS) switch to damper lead L1.
Note: If a smoke detector or other sensing device is to be employed, its NC contact set should be wired in series between the (MCS) position switch normal wire and lead L1.
2. Connect incoming lead L2 to damper lead L2.
3. Connect the reopen switch lead from (MCS) to orange damper lead.
4. Connect the incoming ground lead to the wiring enclosure.
5. Install IDPI (if used) per the schematic.
6. Replace enclosure cover.

Circuit Test

1. Place (MCS) switch in damper close position.
2. Apply power.
Result: The closed indicator light (if used) should be on and the damper blades closed.
3. Transfer (MCS) switch to damper re-open position.
Result: The damper blades should open; the closed indicator light (if used) should go off and the open indicator light (if used) should go on.
4. Transfer (MCS) switch to the normal position.
Result: The damper blades should remain open and the open indicator light (if used) should remain on.
5. Transfer the (MCS) switch to the closed position.
Result: The damper blades should close; the open indicator light (if used) should go off and the closed indicator light (if used) should go on.

Emergency Operation (Smoke Management)

1. MCS Closed Position: Damper will close regardless of whether the thermal switch device has activated or not and regardless of the command for the smoke system.
2. MCS Re-Open Position: If the damper has not been exposed to an elevated temperature higher than its rating, the damper will open. Also, the damper will open regardless of whether the low temperature thermal disc (165 F or 212 F) has activated or not and regardless of a command from additional sensing devices, such as a smoke detector.

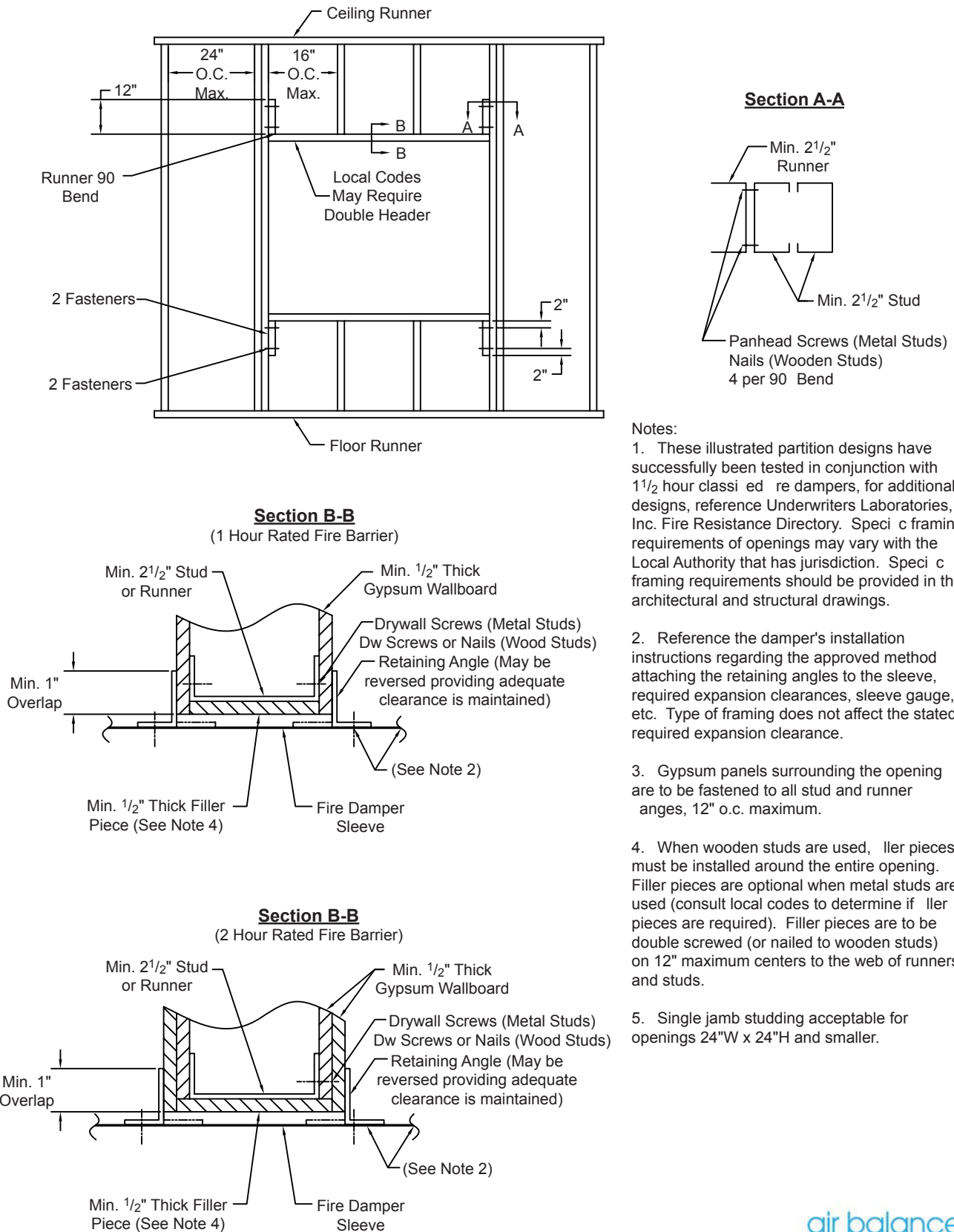
Note: If the master control switch (MCS) is in the re-open position and the high temperature thermal disc has not been tripped, the damper will remain open regardless of whether the low temperature thermal disc and/or other sensing devices have tripped or not. If the damper has been exposed to an elevated temperature higher than its temperature degradation rating, or if the electrical or pneumatic supply has been disconnected, the damper will close and remain closed regardless of any (MCS) position.

Standard Installation

Fire/Smoke Damper Models: FR1, FR2

Smoke Damper Models: SR1, SR2

FRAMING DETAILS (METAL OR WOOD 1 HOUR AND 2 HOUR RATED BARRIERS)



Notes:

1. These illustrated partition designs have successfully been tested in conjunction with 1 1/2 hour classed fire dampers, for additional designs, reference Underwriters Laboratories, Inc. Fire Resistance Directory. Specific framing requirements of openings may vary with the Local Authority that has jurisdiction. Specific framing requirements should be provided in the architectural and structural drawings.
2. Reference the damper's installation instructions regarding the approved method attaching the retaining angles to the sleeve, required expansion clearances, sleeve gauge, etc. Type of framing does not affect the stated required expansion clearance.
3. Gypsum panels surrounding the opening are to be fastened to all stud and runner angles, 12" o.c. maximum.
4. When wooden studs are used, filler pieces must be installed around the entire opening. Filler pieces are optional when metal studs are used (consult local codes to determine if filler pieces are required). Filler pieces are to be double screwed (or nailed to wooden studs) on 12" maximum centers to the web of runners and studs.
5. Single jamb studding acceptable for openings 24"W x 24"H and smaller.

Standard Installation

Combination Fire/Smoke Damper Models: FS1, FS2, FT1, FT2, FA1, FA2, TA1, TA2, FS2C2 Fire Damper Models: MD19, MD39, MA19, MA39

APPLICATION

These dynamically rated fire/smoke and fire dampers are intended to restrict the passage of flame. The dynamically rated fire/smoke dampers are also intended to restrict the passage of smoke. When the damper is intended to be used as a fire rated damper, the standard installation requires that the damper is positioned so that the closed plane of the blades is within the fire rated masonry/concrete or metal or wood framed gypsum wallboard barrier. When the damper is to be used as a leakage rated damper only, the damper is to be installed within 24" of the smoke barrier and upstream of any duct outlets.

This damper may be mounted in the vertical or horizontal position with the damper blades running horizontally. Airflow can be from either direction. When mounted in the vertical position, the damper may be mounted right side up or upside down and can be mounted in a fire barrier constructed of masonry/concrete or metal or wood framed gypsum wallboard materials. When mounted in the horizontal position, the damper must be mounted with the actuator on the top side of the floor and can only be mounted in a fire barrier constructed of masonry/concrete materials.

The Model FS2C2 is approved and labeled for use in the following applications. For sizes not exceeding 24"W x 24"H the Model FS2C2 is approved and labeled for use as a vertically mounted or horizontally mounted, 1½ hour rated Fire/Smoke Damper. When used as a Fire/Smoke Damper, the installation instructions stated in this pamphlet apply. The Model FS2C2 is also approved and labeled for use as a horizontally mounted, 1 hour rated Corridor Damper. When used as a Corridor Damper, the installation instructions stated by II-FS2C-08.11 shall apply.

MULTIPLE PANEL SIZE LIMITATIONS

Actuation		Electric					
Orientation		Horizontal			Vertical		
Assembly		Max Panel	Max Assy 250°	Max Assy 350°	Max Panel	Max Assy 250°	Max Assy 350°
Model	FS1, FS2	36"Wx48"H	72"Wx48"H	72"Wx48"H	36"Wx48"H 48"Wx36"H	144"Wx70"H	128"Wx62"H
	FT1, FT2	30"Wx48"H 36"Wx30"H	60"Wx48"H	60"Wx48"H	36"Wx48"H 42"Wx36"H	126"Wx48"H	126"Wx48"H
	FA1, FA2	32"Wx48"H	96"Wx96"H	96"Wx96"H	32"Wx48"H	128"Wx96"H	128"Wx96"H
	TA1, TA2	30"Wx48"H	60"Wx48"H	60"Wx48"H	30"Wx48"H	60"Wx48"H	60"Wx48"H
	FS2C2	24"W x 24"H	24"W x 24"H	n/a	24"W x 24"H	24"W x 24"H	n/a

Actuation		Pneumatic					
Orientation		Horizontal			Vertical		
Assembly		Max Panel	Max Assy 250°	Max Assy 350°	Max Panel	Max Assy 250°	Max Assy 350°
Model	FS1, FS2	36"Wx48"H	72"Wx48"H	72"Wx48"H	36"Wx48"H	108"Wx48"H	108"Wx48"H
	FT1, FT2	30"Wx48"H 36"Wx30"H	60"Wx48"H	60"Wx48"H	36"Wx48"H 42"Wx36"H	126"Wx48"H	126"Wx48"H
	FA1, FA2	32"Wx48"H	96"Wx96"H	96"Wx96"H	32"Wx48"H	128"Wx96"H	128"Wx96"H
	TA1, TA2	30"Wx48"H	60"Wx48"H	60"Wx48"H	30"Wx48"H	60"Wx48"H	60"Wx48"H

Actuation		Non-Motorized					
Orientation		Horizontal			Vertical		
Assembly		Max Panel	Max Assy 165°	Max Assy 212°	Max Panel	Max Assy 165°	Max Assy 212°
Model	MD19	36"Wx48"H	72"Wx48"H	72"Wx48"H	36"Wx48"H	72"Wx60"H 126"Wx48"H	72"Wx60"H 126"Wx48"H
	MD39	30"Wx48"H 36"Wx30"H	60"Wx48"H	60"Wx48"H	36"Wx48"H	126"Wx48"H	126"Wx48"H
	MA19	32"Wx48"H	64"Wx36"H 32"Wx72"H	64"Wx36"H 32"Wx72"H	32"Wx48"H	64"Wx36"H 32"Wx72"H	64"Wx36"H 32"Wx72"H
	MA39	32"Wx48"H	60"Wx36"H	60"Wx36"H	32"Wx48"H	60"Wx36"H	60"Wx36"H

SUPPLEMENTAL INSTALLATION INSTRUCTIONS / SUBMITTAL DATA

One-Side Retaining Angles (II-FSOS)
Out-of-Wall/Floor
Sleeve Extension
Integral Duct Access Door
Electric or Pneumatic Heat Response Device (SD-EHRD or SD-PHRD)
Integral Dual Position Indication (SD-IDPI)
Electric or Pneumatic Sensotherm (SD-ESOT or SD-PSOT)
Flow-Rated Smoke Detector (SM-501)
No-Flow Smoke Detector (2151)
Transitions (SD-TRFS)
Sleeves (SD-SLVFS)

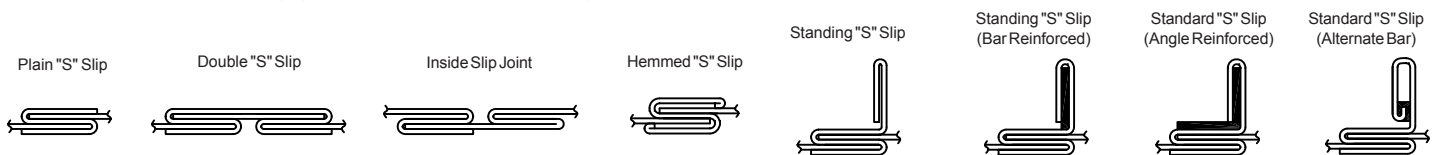
INSTALLATION

- General:** The installation of the damper and all duct connections to the damper sleeve shall conform to NFPA-90A and the SMACNA Fire, Smoke and Radiation Damper Installation Guide. All duct connections shall also conform to UL555 when the damper is intended to be used as a fire damper.
- Actuators:** Dampers must be supplied with factory mounted actuators (except Model MD19, MD39 and MA19, MA39) and are intended to close automatically when sensing heat or upon loss of electrical power or release of air pressure. When this damper is used as a leakage rated damper only, it shall be arranged to operate automatically and is to be controlled by a smoke detector. See additional instructions, which detail damper actuator sequence of operations.

Multiple actuators in a mechanically linked section that are factory wired/plumbed together have only one heat response device and one supply connection point. The supply connection point must be at the "master" actuator package, which contains the heat response device. The heat response device must be wired/plumbed between the supply connection point and the master actuator and all slave actuators.
- Multiple Panel / Multiple Section Assembly:** Large damper assembly sizes may require multiple factory assembled modules that ship separately. Refer to page 4 for details.
- Sleeves:** Sleeves are required for the proper installation of fire rated dampers, but need not be factory mounted. Dampers with factory mounted external actuators can be supplied without sleeves, but require sideplates. Dampers with factory mounted internal actuators can be supplied without sleeves or sideplates. Sleeves shall be the same gauge or heavier as the duct to which it is attached. Gauges shall conform to SMACNA or ASHRAE duct standards. A field supplied sleeve is attached to the damper frame with 3/16" diameter steel rivets, 1/4" diameter steel bolts, #10 steel sheet metal screws, or 1/2" long welds. Fasteners shall be staggered on each side of the damper frame on 6" maximum centers and 3-1/2" maximum from each corner. For Class I Fire/Smoke dampers, approved caulking (reference note 7) shall be applied along the perimeter between the sleeve and the damper on both sides. For Class II Fire/Smoke dampers, approved caulking (reference note 7) shall be applied along the perimeter between the sleeve and the damper on only one side.
- Expansion Clearance:** The opening in the wall for the fire rated damper shall be sized to provide expansion clearance between the sleeve and the opening. The minimum expansion clearance shall be the greater of 1/4" or 1/8" per foot of overall damper/sleeve width and height. The maximum expansion clearance shall not exceed 1/8" per foot of overall damper/sleeve width and height plus 2".
Example: For a damper with exact outside dimensions of 36"W x 48"H, the gap at the top plus the gap at the bottom must be between 0.50" and 2.5". The gap at the left side plus the gap at the right side must be between 0.375" and 2.375". The damper can be located anywhere in the opening and need not be centered.
- Retaining Angle Attachment:** Perimeter retaining angles shall increase in size, proportionately, so there will be a minimum of 1" overlap on the wall, including at the corners. The angles shall be flush against the barrier. The leg attached to the damper can turn away from or into the opening. In metal frame construction, the angles can be mounted under or over the gypsum board. In wood frame construction, the angles must be mounted over the gypsum board. The perimeter mounting angles shall be fastened on all four sides and on both faces of the damper to the sleeve only, with 3/16" diameter steel or stainless steel nuts and bolts or by tack welding with beads 1/2" ± 1/4" in length or with #10 steel or stainless steel sheet metal screws or 3/16" steel or stainless steel pop rivets. All connections shall be spaced on 6" maximum centers and 3" maximum from each corner (a minimum of 2 fasteners are required per side). For perimeter angle mounting on one side of the fire barrier only, reference Installation Instruction II-FSOS. Perimeter retaining angles shall be a minimum of 1-1/2" x 7/8" x 16-GA steel. Corners of angles are not welded together for dampers with width or height dimensions exceeding 24". For dampers 24"W x 24"H or smaller, the corners of the perimeter mounting angles can be welded. Some local codes may not allow welded corners. Attachment of these angles must not restrict operation of the damper. Perimeter retaining angles and their mounting fasteners are not typically supplied with the damper.
- Caulking:** Caulk shall be one of the following: Dow Corning RTV732, Silco Sil-Bond RTV 4500, General Electric IS808, or Novagard RTV300. Caulking is allowed between the retaining angles and the damper sleeve, and between the retaining angles and the face of the floor or wall construction. Caulking is not allowed between the damper sleeve and the wall or floor inside the opening.

Breakaway flange caulking shall be Design Polymeric's DP1010 or Precision's PA2084T

- Duct Connections:** All connecting ducts shall not be continuous, but shall terminate at the fire damper sleeve. Duct connections not listed as breakaways shall be considered rigid. For rigid type duct connections, the sleeve shall be a minimum of 16-GA on dampers not exceeding 36" wide or 24" high or 24" diameter and 14-GA on larger units. Maximum sleeve thickness shall not exceed 10-GA galvanized steel. Dampers supplied with thinner sleeves require a breakaway connection. The following breakaway duct-to-sleeve connections may be used: Plain "S" Slip, Double "S" Slip, Inside Slip, Hemmed "S" Slip, Standing "S" Slip (Bar Reinforced), and Standing "S" Slip (Alternate Bar). Breakaway joints shall have no more than two No. 10 sheet metal screws on each side and on the bottom. The screws shall penetrate both sides of the slip pocket. When a breakaway joint is used along the top and bottom duct connection, a flat drive slip no longer than 20 inches is permitted on the two sides. The damper is normally supplied with a factory attached sleeve (see Note 4 when field supplied sleeve). The standard factory supplied sleeve is 20-GA galvanized steel (18-GA on dampers wider or higher than 84") and assumes that a breakaway type duct connection will be employed.



The factory supplied round/oval transition provides the breakaway connection if the following conditions are satisfied.

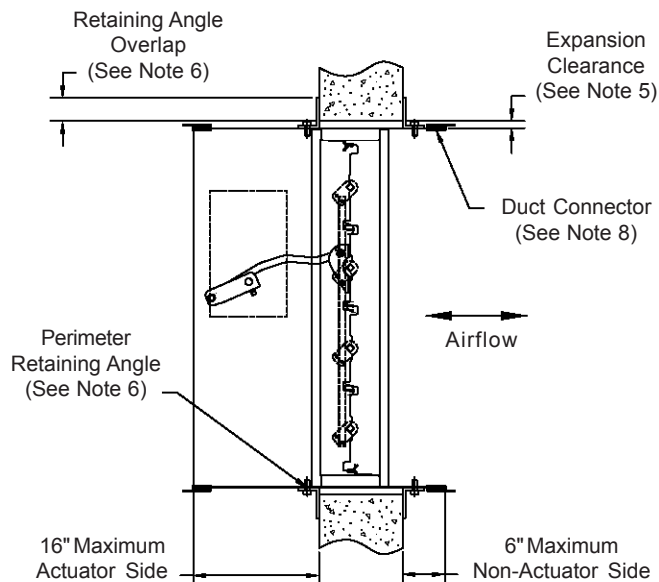
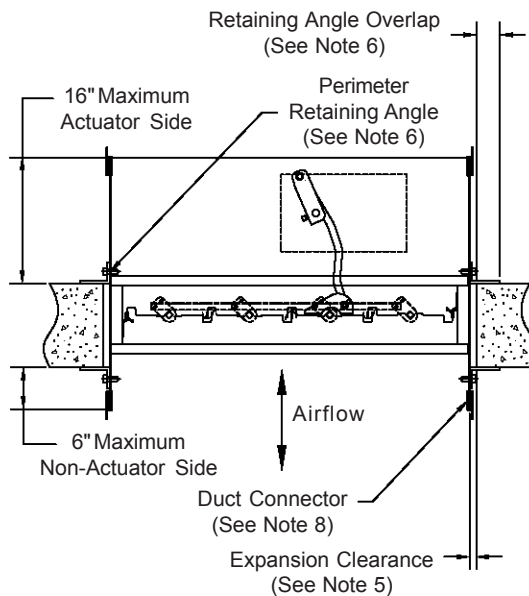
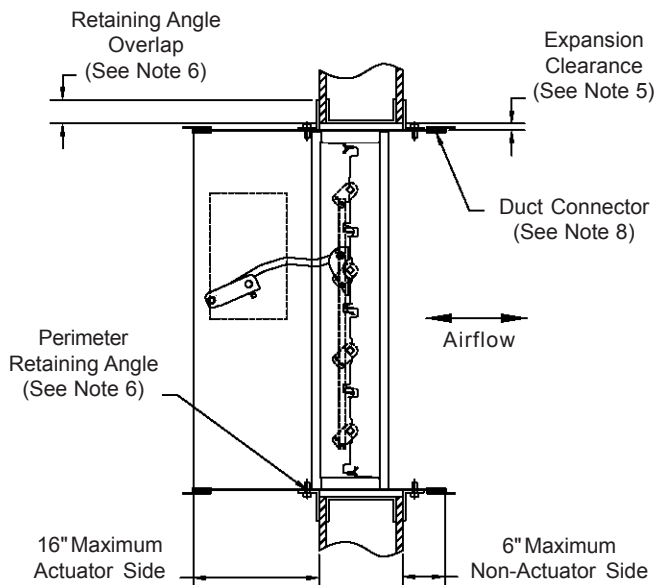
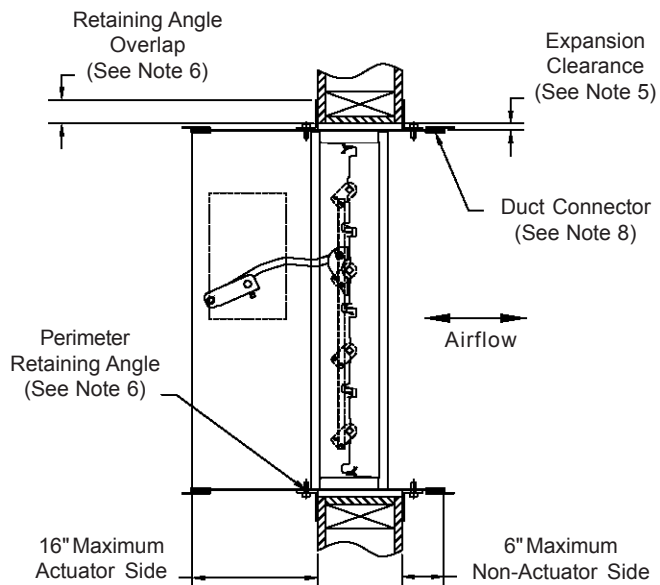
- Round duct diameter is no larger than 36".
- Oval duct size is no larger than 71"W x 30"H.
- Duct gauges conform to the SMACNA or ASHRAE standard.
- An oval duct or round duct less than or equal to 24" is attached to the transition collar with #8 sheet metal screws (a minimum of 4 fasteners per connection). A round duct diameter greater than 24" is attached to the transition collar with #10 sheet metal screws (a minimum of 5 fasteners per connection).

Dampers with round/oval transitions that fall outside of these restrictions must use a 4" wide drawband connection as shown in the SMACNA Fire, Smoke, and Radiation Damper Installation Guide.

- Maintenance:** Dampers shall be maintained at intervals as stated in NFPA 90A and 92A. Local codes or building conditions may require more frequent inspections and maintenance. A duct access door is to be located on the jackshaft side of each damper for periodic inspection and maintenance.



STANDARD MOUNTING DETAILS

Vertical, 2-Side Retaining, Masonry**Horizontal, 2-Side Retaining, Masonry****Vertical, 2-Side Retaining, Metal Stud****Vertical, 2-Side Retaining, Wood Stud**

MULTIPLE PANEL / MULTIPLE SECTION INSTALLATION DETAILS

Fire/Smoke Dampers (Models FS1, FS2, FT1, FT2, FA1, FA2, TA1, TA2)

1. Damper assemblies ordered without factory mounted sleeves are limited in size, so that the entire assembly ships as a single section.
2. Multiple panel high damper assemblies are electrically/pneumatically, but not mechanically linked between top and bottom panels if assembled within a common sleeve. Large sizes may require multiple sleeve sections - multiple sleeve sections are not mechanically or electrically/pneumatically linked.
3. Multiple panel wide damper assemblies are mechanically and electrically/pneumatically linked if assembled within a common sleeve. Large sizes may require multiple sleeve sections - multiple sleeve sections are not mechanically or electrically/pneumatically linked.
4. Damper assembly sections that are not mechanically or electrically/pneumatically linked each have their own heat response device and their own supply connection point, such that they operate independently. Multiple actuators within a linked section are factory wired/plumbed together.
5. Damper assembly sections that are mechanically and electrically/pneumatically linked share a single heat response device and a single supply connection point. Multiple actuators within a linked section are factory wired/plumbed together.
6. Damper assemblies that ship in multiple sections shall be fastened together using 1/4" diameter steel bolts, lockwashers, and nuts. Fasteners shall be on 6" maximum centers on both faces of the frame.

Fire Dampers (MD19, MD39, MA19, MA39)

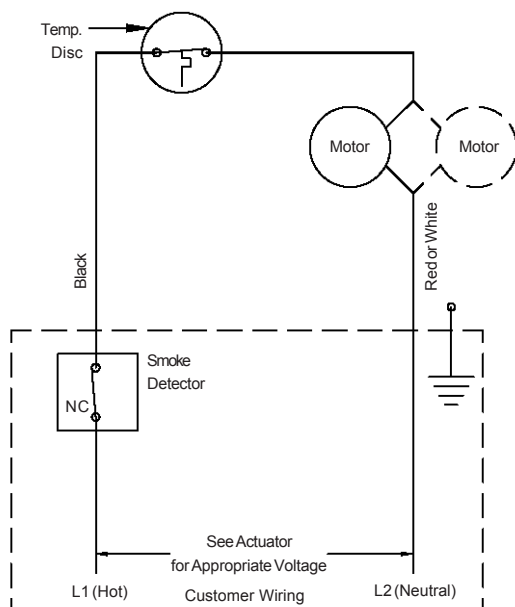
1. Damper assemblies ordered without factory mounted sleeves are limited in size, so that the entire assembly ships as a single section.
2. Multiple panel high damper assemblies are not mechanically linked between top and bottom panels.
3. Multiple panel wide damper assemblies are not mechanically linked between panels.
4. Damper assembly sections that are not mechanically linked each have their own heat response device, such that they operate independently.
5. Damper assemblies that ship in multiple sections shall be fastened together using 1/4" diameter steel bolts, lockwashers, and nuts. Fasteners shall be on 6" maximum centers on both faces of the frame.

ELECTRIC WIRING SCHEMATICS

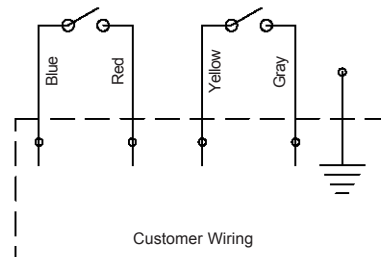
Notes

1. All wiring to be in accordance with N.E.C. (NFPA 70).
2. Refer to actuator label for appropriate voltage.
3. Connect incoming ground to the actuator assembly.
4. If the actuator remains electrically energized, yet the damper remains in the closed position, check to ensure that the reset button on the heat response device is depressed.

Electric Heat Response Device (EHRD)



Integral Dual Position Indication (IDPI)

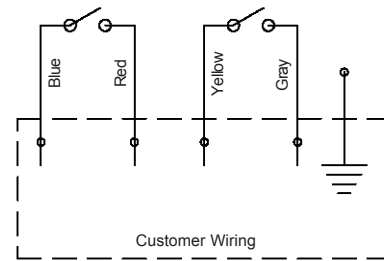
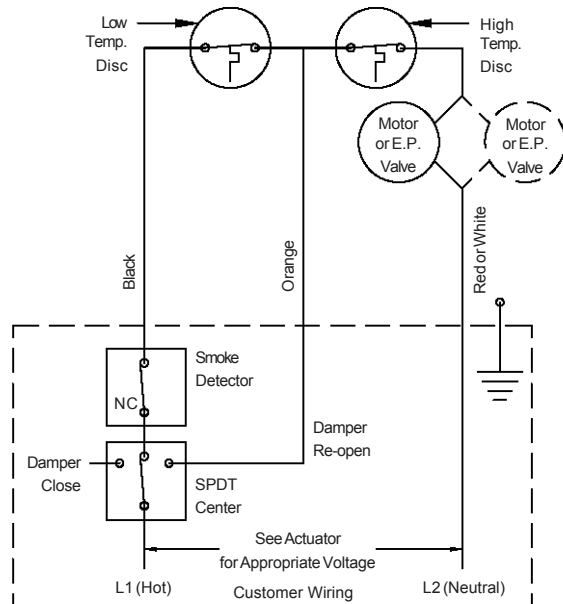


Integral Dual Position Indication (IDPI) Wiring Chart			
actuator mounting location	damper full open	damper full close	damper mid-stroke
	closed circuit		
external left	red / blue	yellow / gray	none
external right	yellow / gray	red / blue	none
internal left	yellow / gray	red / blue	none
internal right	red / blue	yellow / gray	none

* This wiring is opposite if the actuator is rotated 90°, so that it is parallel to the duct.



ELECTRIC WIRING SCHEMATICS (CONT.)

Electric/Pneumatic Sensotherm (ESOT/PSOT) with included Integral Dual Position Indication (IDPI)

Integral Dual Position Indication (IDPI) Wiring Chart			
actuator mounting location	damper full open	damper full close	damper mid-stroke
	closed circuit		
external left	red / blue	yellow / gray	none
external right	yellow / gray	red / blue	none
internal left	yellow / gray	red / blue	none
internal right	red / blue	yellow / gray	none

* This wiring is opposite if the actuator is rotated 90°, so that it is parallel to the duct.

ESOT/PSOT Wiring, Test, and Operating Instructions

Damper is supplied with one low temperature thermal disc and one high temperature thermal disc. All dampers require a master control switch (supplied by others) for re-openable operation.

CUSTOMER WIRING

1. Connect input power lead L1 from the normal closed position lead of the (MCS) switch to damper lead L1.
Note: If a smoke detector or other sensing device is to be employed, its NC contact set should be wired in series between the (MCS) position switch normal wire and lead L1.
2. Connect incoming lead L2 to damper lead L2.
3. Connect the reopen switch lead from (MCS) to orange damper lead.
4. Connect the incoming ground lead to the wiring enclosure.
5. Install IDPI (if used) per the schematic.
6. Replace enclosure cover.

CIRCUIT TEST

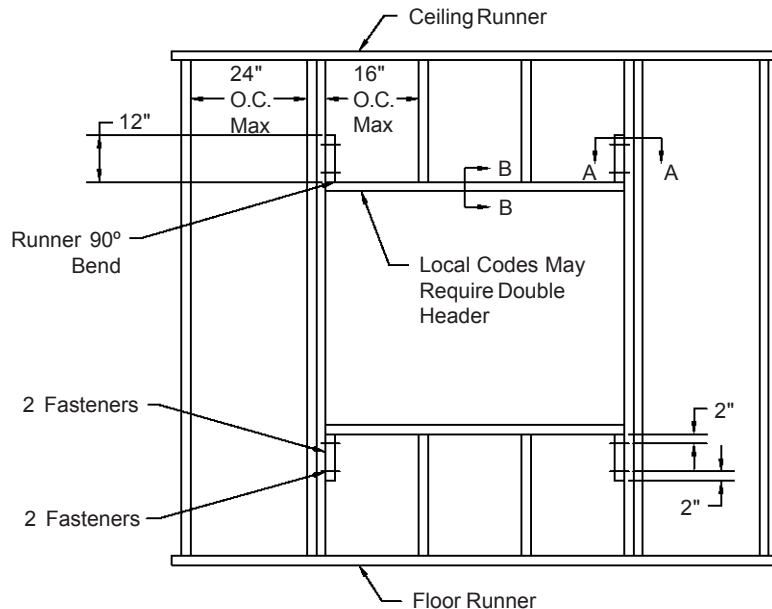
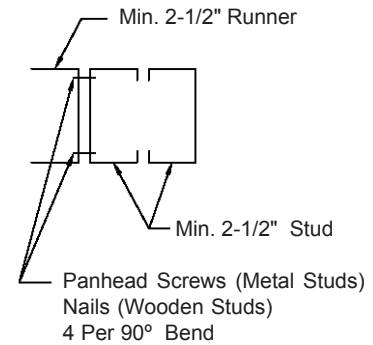
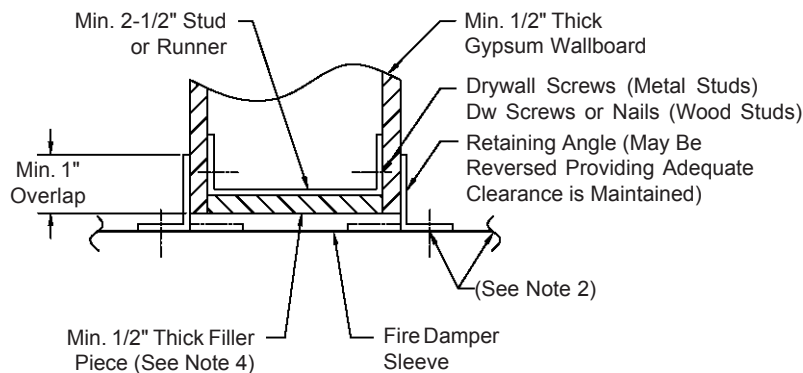
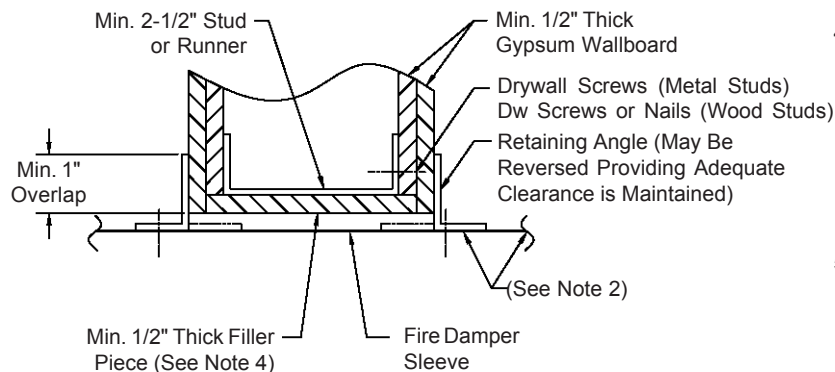
1. Place (MCS) switch in damper close position.
2. Apply power.
Result: The closed indicator light (if used) should be on and the damper blades closed.
3. Transfer (MCS) switch to damper re-open position.
Result: The damper blades should open; the closed indicator light (if used) should go off and the open indicator light (if used) should go on.
4. Transfer (MCS) switch to the normal position.
Result: The damper blades should remain open and the open indicator light (if used) should remain on.
5. Transfer the (MCS) switch to the closed position.
Result: The damper blades should close; the open indicator light (if used) should go off and the closed indicator light (if used) should go on.

EMERGENCY OPERATION (SMOKE MANAGEMENT)

1. **MCS closed position:** Damper will close regardless of whether the thermal switch device has activated or not and regardless of the command from the smoke system.
2. **MCS re-open position:** If the damper has not been exposed to an elevated temperature higher than its rating, the damper will open. Also, the damper will open regardless of whether the low temperature thermal disc (165°F or 212°F) has activated or not and regardless of a command from additional sensing devices, such as a smoke detector.

NOTE: If the master control switch (MCS) is in the re-open position and the high temperature thermal disc has not been tripped, the damper will remain open regardless of whether the low temperature thermal disc and/or other sensing devices have tripped or not. If the damper has been exposed to an elevated temperature higher than its temperature degradation rating, or if the electrical or pneumatic supply has been disconnected, the damper will close and remain closed regardless of any (MCS) position.

FRAMING DETAILS (METAL OR WOOD 1 HOUR AND 2 HOUR RATED BARRIERS)

**Section A-A****Section B-B**
(1 Hour Rated Fire Barrier)**Section B-B**
(2 Hour Rated Fire Barrier)**NOTES:**

1. These illustrated partition designs have successfully been tested in conjunction with 1-1/2 hour classified fire dampers, for additional designs, reference Underwriters Laboratories, Inc. Fire Resistance Directory. Specific framing requirements of openings may vary with the Local Authority that has jurisdiction. Specific framing requirements should be provided in the architectural and structural drawings.
2. Reference the damper's installation instructions regarding the approved method of attaching the damper to the sleeve, attaching the retaining angles to the sleeve, required expansion clearances, sleeve gauge, etc. Type of framing does not affect the stated required expansion clearance.
3. Gypsum panels surrounding the opening are to be fastened to all stud and runner flanges, 12" o.c. maximum.
4. When wooden studs are used, filler pieces must be installed around the entire opening. Filler pieces are optional when metal studs are used (consult local codes to determine if filler pieces are required). Filler pieces are to be double screwed (or nailed to wooden studs) on 12" max. centers to the web of runners and studs.
5. Double jamb studding shown and required when opening width or length exceeds 36". Single jamb studding acceptable for openings 36"W x 36"H and smaller.

Standard Installation

Combination Fire/Smoke Damper Models: FS1(SS), FS2(SS)

Fire Damper Models: MD19(SS)

APPLICATION

These dynamically rated fire/smoke and fire dampers are intended to restrict the passage of flame. The dynamically rated fire/smoke dampers are also intended to restrict the passage of smoke. When the damper is intended to be used as a fire rated damper, the standard installation requires that the damper is positioned so that the closed plane of the blades is within the fire rated masonry/concrete or metal or wood framed gypsum wallboard barrier. When the damper is to be used as a leakage rated damper only, the damper is to be installed within 24" of the smoke barrier and upstream of any duct outlets.

This damper may be mounted in the vertical or horizontal position with the damper blades running horizontally. Airflow can be from either direction. When mounted in the vertical position, the damper may be mounted right side up or upside down and can be mounted in a fire barrier constructed of masonry/concrete or metal or wood (32"W x 32"H maximum in wood framing) framed gypsum wallboard materials. When mounted in the horizontal position, the damper must be mounted with the actuator on the top side of the floor and can only be mounted in a fire barrier constructed of masonry/concrete materials.

MULTIPLE PANEL SIZE LIMITATIONS

Actuation		Electric						
Orientation		Horizontal			Vertical			
Assembly		Max Panel 250°	Max Panel 350°	Max Assy	Max Panel 250°	Max Panel 350°	Max Assy 250°	Max Assy 350°
Model	FS1(SS)	24"Wx24"H	not available	not available	36"Wx32"H	not available	108"Wx32"H	not available
	FS2(SS)	24"Wx24"H	24"Wx24"H	not available	36"Wx32"H	36"Wx32"H	108"Wx32"H	108"Wx32"H

Actuation		Pneumatic						
Orientation		Horizontal			Vertical			
Assembly		Max Panel 250°	Max Panel 350°	Max Assy	Max Panel 250°	Max Panel 350°	Max Assy 250°	Max Assy 350°
Model	FS1(SS)	24"Wx24"H	not available	not available	36"Wx32"H	not available	108"Wx32"H	not available
	FS2(SS)	24"Wx24"H	24"Wx24"H	not available	36"Wx32"H	36"Wx32"H	108"Wx32"H	108"Wx32"H

Actuation		Non-Motorized						
Orientation		Horizontal			Vertical			
Assembly		Max Panel 165°	Max Panel 212°	Max Assy	Max Panel 165°	Max Panel 212°	Max Assy 165°	Max Assy 212°
Model	MD19(SS)	24"Wx24"H	24"Wx24"H	not available	36"Wx32"H	36"Wx32"H	108"Wx32"H	108"Wx32"H

SUPPLEMENTAL INSTALLATION INSTRUCTIONS / SUBMITTAL DATA

Sleeve Extension
 Integral Duct Access Door
 Electric or Pneumatic Heat Response Device (SD-EHRD or SD-PHRD)
 Integral Dual Position Indication (SD-IDPI)
 Electric or Pneumatic Sensotherm (SD-ESOT or SD-PSOT)
 Flow-Rated Smoke Detector (SM-501)
 No-Flow Smoke Detector (2151)
 Transitions (SD-TRFS)
 Sleeves (SD-SLVFS)

INSTALLATION

- General:** The installation of the damper and all duct connections to the damper sleeve shall conform to NFPA-90A and the SMACNA Fire, Smoke and Radiation Damper Installation Guide. All duct connections shall also conform to UL555 when the damper is intended to be used as a fire damper.
- Actuators:** Dampers must be supplied with factory mounted actuators (except Model MD19(SS)) and are intended to close automatically when sensing heat or upon loss of electrical power or release of air pressure. When this damper is used as a leakage rated damper only, it shall be arranged to operate automatically and is to be controlled by a smoke detector. See additional instructions, which detail damper actuator sequence of operations.

Multiple actuators in a mechanically linked section that are factory wired/plumbed together have only one heat response device and one supply connection point. The supply connection point must be at the "master" actuator package, which contains the heat response device. The heat response device must be wired/plumbed between the supply connection point and the master actuator and all slave actuators.

- Multiple Panel / Multiple Section Assembly:** Refer to page 4 for details.
- Sleeves:** Sleeves are required for the proper installation of fire rated dampers, but need not be factory mounted. Dampers with factory mounted external actuators can be supplied without sleeves, but require sideplates. Dampers with factory mounted internal actuators can be supplied without sleeves or sideplates. Sleeves shall be the same gauge or heavier as the duct to which it is attached. Gauges shall conform to SMACNA or ASHRAE duct standards. A field supplied sleeve is attached to the damper frame with 3/16" diameter stainless steel rivets, 1/4" diameter stainless steel bolts, #10 stainless steel sheet metal screws, or 1/2" long welds. Fasteners shall be staggered on each side of the damper frame on 6" maximum centers and 3-1/2" maximum from each corner. For Class I Fire/Smoke dampers, approved caulking (reference note 7) shall be applied along the perimeter between the sleeve and the damper on both sides. For Class II Fire/Smoke dampers, approved caulked (reference note 7) shall be applied along the perimeter between the sleeve and the damper on only one side.
- Expansion Clearance:** The opening in the wall for the fire rated damper shall be sized to provide expansion clearance between the sleeve and the opening. The minimum expansion clearance shall be the greater of 1/4" or 1/8" per foot of overall damper/sleeve width and height. The maximum expansion clearance shall not exceed 1/8" per foot of overall damper/sleeve width and height plus 2".
Example: For a damper with exact outside dimensions of 36"W x 48"H, the gap at the top plus the gap at the bottom must be between 0.25" and 2.25". The gap at the left side plus the gap at the right side must be between 0.375" and 2.375". The damper can be located anywhere in the opening and need not be centered.
- Retaining Angle Attachment:** Perimeter retaining angles shall increase in size, proportionately, so there will be a minimum of 1" overlap on the wall, including at the corners. The angles shall be flush against the barrier. The leg attached to the damper can turn away from or into the opening. In metal frame construction, the angles can be mounted under or over the gypsum board. In wood frame construction, the angles must be mounted over the gypsum board. The perimeter mounting angles shall be fastened on all four sides and on both faces of the damper to the sleeve only, with 3/16" diameter stainless steel nuts and bolts or by tack welding with beads 1/2" ± 1/4" in length or with #10 stainless steel sheet metal screws or 3/16" stainless steel pop rivets. All connections shall be spaced on 6" maximum centers and 3" maximum from each corner (a minimum of 2 fasteners are required per side). Perimeter retaining angles shall be a minimum of 1-1/2" x 7/8" x 16 gauge steel. Corners of angles are not welded together for dampers with width or height dimensions exceeding 24". For dampers 24"W x 24"H or smaller, the corners of the perimeter mounting angles can be welded. Some local codes may not allow welded corners. Attachment of these angles must not restrict operation of the damper. Perimeter retaining angles and their mounting fasteners are not typically supplied with the damper.
- Caulking:** Caulk shall be one of the following: Dow Corning RTV732, Silco Sil-Bond RTV 4500, General Electric IS808, or Novagard RTV300. Caulking is allowed between the retaining angles and the damper sleeve, and between the retaining angles and the face of the floor or wall construction. Caulking is not allowed between the damper sleeve and the wall or floor inside the opening.

Breakaway flange caulking shall be Design Polymeric's DP1010 or Precision's PA2084T.

- Duct Connections:** All connecting ducts shall not be continuous, but shall terminate at the fire damper sleeve. Duct connections not listed as breakaways shall be considered rigid. For rigid type duct connections, the sleeve shall be a minimum of 16-GA on dampers not exceeding 36" wide or 24" high or 24" diameter and 14-GA on larger units. Maximum sleeve thickness shall not exceed 10-GA galvanized steel. Dampers supplied with thinner sleeves require a breakaway connection. The following breakaway duct-to-sleeve connections may be used: Plain "S" Slip, Double "S" Slip, Inside Slip, Hemmed "S" Slip, Standing "S" Slip, Standing "S" Slip (Bar Reinforced), Standard "S" Slip (Angle Reinforced), and Standard "S" Slip (Alternate Bar). Breakaway joints shall have no more than two No. 10 sheet metal screws on each side and on the bottom. The screws shall penetrate both sides of the slip pocket. When a breakaway joint is used along the top and bottom duct connection, a flat drive slip no longer than 20 inches is permitted on the two sides. The damper is normally supplied with a factory attached sleeve (see Note 4 when field supplied sleeve). The standard factory supplied sleeve is 20-GA stainless steel (18-GA on dampers wider or higher than 84") and assumes that a breakaway type duct connection will be employed.



The factory supplied round/oval transition provides the breakaway connection if the following conditions are satisfied.

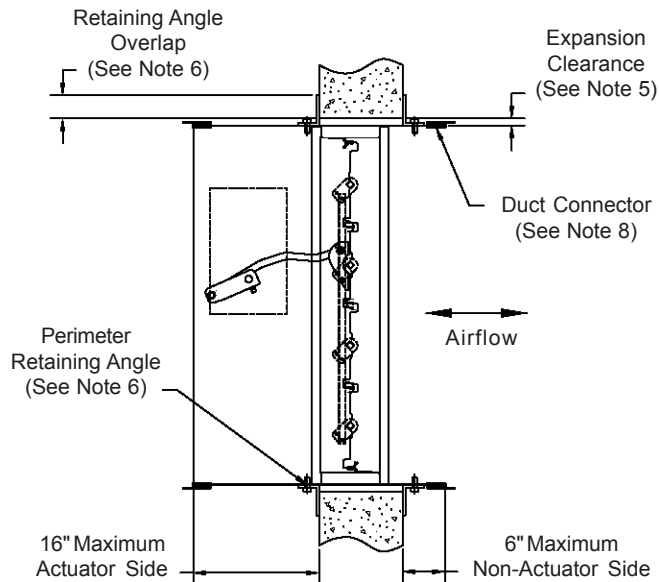
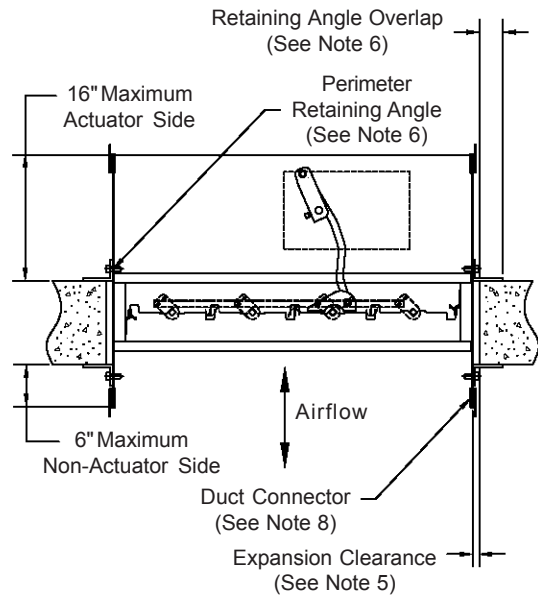
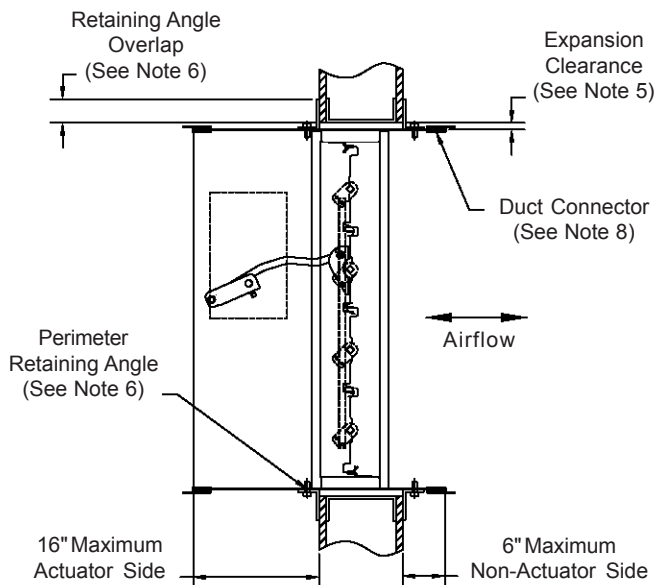
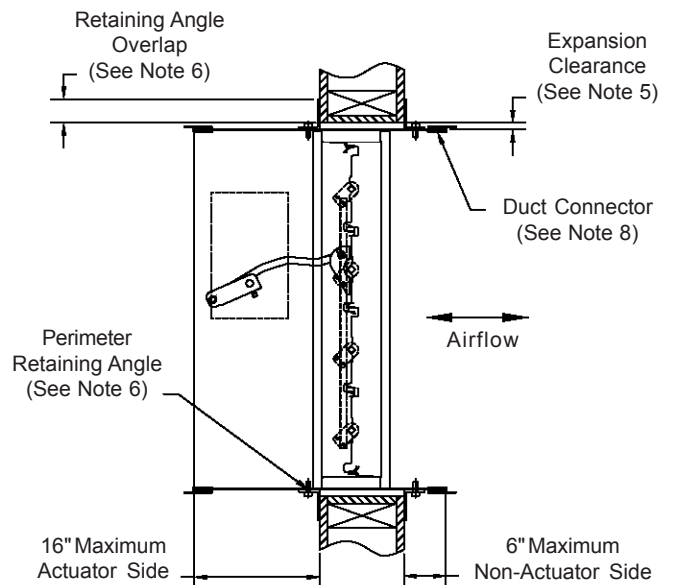
- Round duct diameter is no larger than 30".
- Oval duct size is no larger than 71"W x 30"H.
- Duct gauges conform to the SMACNA or ASHRAE standard.
- An oval duct or round duct less than or equal to 24" is attached to the transition collar with #8 sheet metal screws (a minimum of 4 fasteners per connection). A round duct diameter greater than 24" is attached to the transition collar with #10 sheet metal screws (a minimum of 5 fasteners per connection).

Damper with round/oval transitions that fall outside of these restrictions must use a 4" wide drawband connection as shown in the SMACNA Fire, Smoke, and Radiation Damper Installation Guide.

- Maintenance:** Dampers shall be maintained at intervals as stated in NFPA 90A and 92A. Local codes or building conditions may require more frequent inspections and maintenance. A duct access door is to be located on the jackshaft side of each damper for periodic inspection and maintenance.



STANDARD MOUNTING DETAILS

Vertical, 2-Side Retaining, Masonry**Horizontal, 2-Side Retaining, Masonry****Vertical, 2-Side Retaining, Metal Stud****Vertical, 2-Side Retaining, Wood Stud**

*See multiple panel size limitations on page 1 for further restrictions.

MULTIPLE PANEL / MULTIPLE SECTION INSTALLATION DETAILS

Fire/Smoke Dampers (Models FS1(SS), FS2(SS))

1. Damper assemblies ordered without factory mounted sleeves are limited in size, so that the entire assembly ships as a single section.
2. Multiple panel wide damper assemblies are mechanically and electrically/pneumatically linked.
3. Damper assembly sections that are mechanically and electrically/pneumatically linked share a single heat response device and a single supply connection point. Multiple actuators within a linked section are factory wired/plumbed together.

Fire Dampers (MD19(SS))

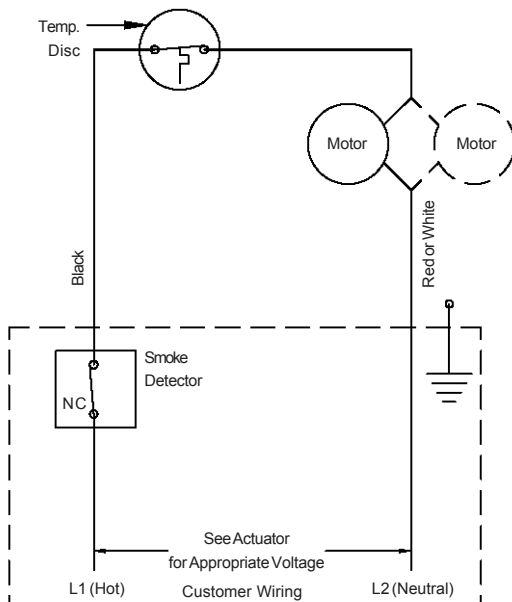
1. Damper assemblies ordered without factory mounted sleeves are limited in size, so that the entire assembly ships as a single section.
2. Multiple panel wide damper assemblies are not mechanically linked between panels.
3. Damper assembly sections that are not mechanically linked each have their own heat response device, such that they operate independently.
4. Damper assemblies that ship in multiple sections shall be fastened together using 1/4" diameter stainless steel bolts, lockwashers, and nuts. Fasteners shall be on 6" maximum centers on both faces of the frame.

ELECTRIC WIRING SCHEMATICS

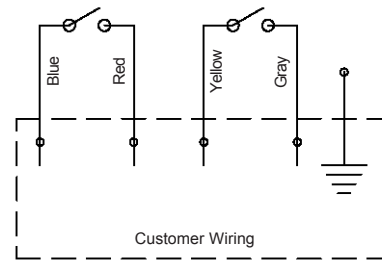
Notes

1. All wiring to be in accordance with N.E.C. (NFPA 70).
2. Refer to actuator label for appropriate voltage.
3. Connect incoming ground to the actuator assembly.
4. If the actuator remains electrically energized, yet the damper remains in the closed position, check to ensure that the reset button on the heat response device is depressed.

Electric Heat Response Device (EHRD)



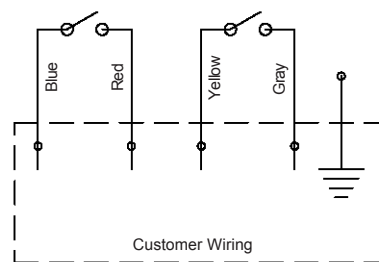
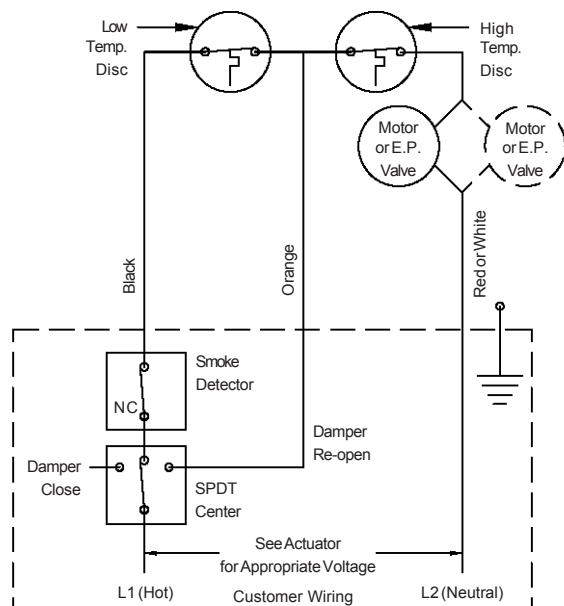
Integral Dual Position Indication (IDPI)



Integral Dual Position Indication (IDPI) Wiring Chart			
actuator mounting location	damper full open	damper full close	damper mid-stroke
	closed circuit		
external left	red / blue	yellow / gray	none
external right	yellow / gray	red / blue	none
internal left	yellow / gray	red / blue	none
internal right	red / blue	yellow / gray	none

* This wiring is opposite if the actuator is rotated 90°, so that it is parallel to the duct.

ELECTRIC WIRING SCHEMATICS (CONT.)

Electric/Pneumatic Sensotherm (ESOT/PSOT) with included Integral Dual Position Indication (IDPI)

Integral Dual Position Indication (IDPI) Wiring Chart			
actuator mounting location	damper full open	damper full close	damper mid-stroke
	closed circuit		
external left	red / blue	yellow / gray	none
external right	yellow / gray	red / blue	none
internal left	yellow / gray	red / blue	none
internal right	red / blue	yellow / gray	none

* This wiring is opposite if the actuator is rotated 90°, so that it is parallel to the duct.

ESOT/PSOT Wiring, Test, and Operating Instructions

Damper is supplied with one low temperature thermal disc and one high temperature thermal disc. All dampers require a master control switch (supplied by others) for re-openable operation.

CUSTOMER WIRING

1. Connect input power lead L1 from the normal closed position lead of the (MCS) switch to damper lead L1.
Note: If a smoke detector or other sensing device is to be employed, its NC contact set should be wired in series between the (MCS) position switch normal wire and lead L1.
2. Connect incoming lead L2 to damper lead L2.
3. Connect the re-open switch lead from (MCS) to orange damper lead.
4. Connect the incoming ground lead to the wiring enclosure.
5. Install IDPI (if used) per the schematic.
6. Replace enclosure cover.

CIRCUIT TEST

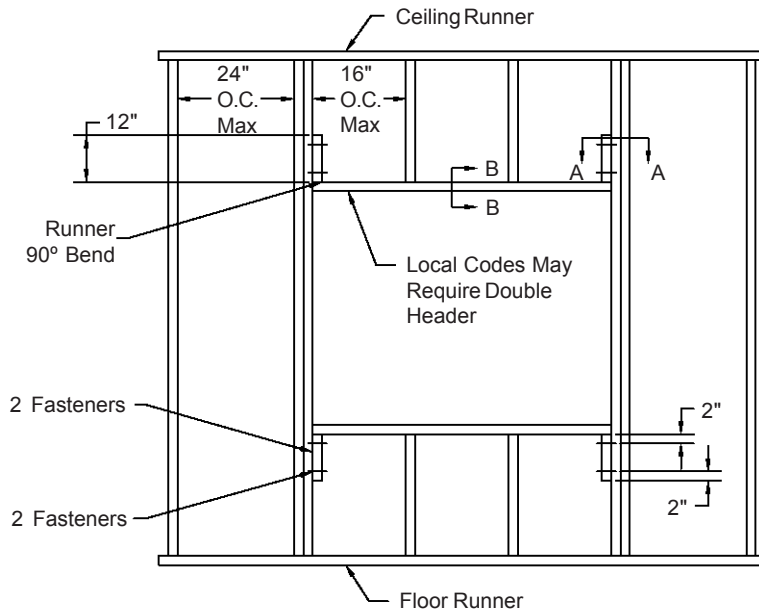
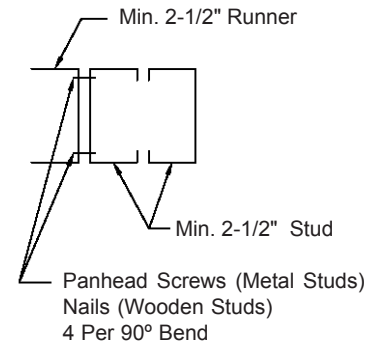
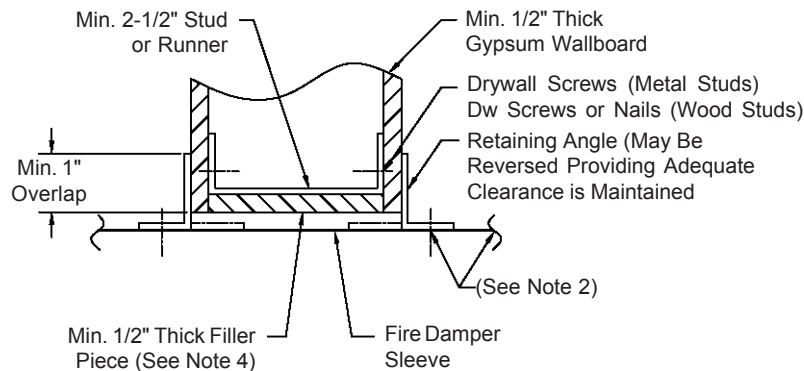
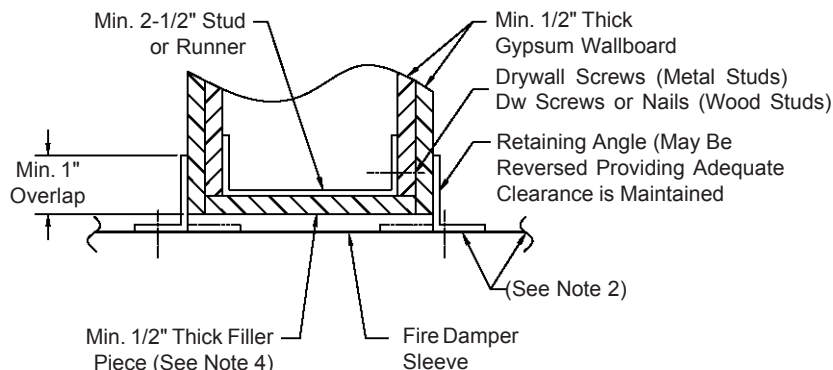
1. Place (MCS) switch in damper close position.
2. Apply power.
Result: The closed indicator light (if used) should be on and the damper blades closed.
3. Transfer (MCS) switch to damper re-open position.
Result: The damper blades should open; the closed indicator light (if used) should go off and the open indicator light (if used) should go on.
4. Transfer (MCS) switch to the normal position.
Result: The damper blades should remain open and the open indicator light (if used) should remain on.
5. Transfer the (MCS) switch to the closed position.
Result: The damper blades should close; the open indicator light (if used) should go off and the closed indicator light (if used) should go on.

EMERGENCY OPERATION (SMOKE MANAGEMENT)

1. **MCS closed position:** Damper will close regardless of whether the thermal switch device has activated or not and regardless of the command from the smoke system.
2. **MCS re-open position:** If the damper has not been exposed to an elevated temperature higher than its rating, the damper will open. Also, the damper will open regardless of whether the low temperature thermal disc (165°F or 212°F) has activated or not and regardless of a command from additional sensing devices, such as a smoke detector.

NOTE: If the master control switch (MCS) is in the re-open position and the high temperature thermal disc has not been tripped, the damper will remain open regardless of whether the low temperature thermal disc and/or other sensing devices have tripped or not. If the damper has been exposed to an elevated temperature higher than its temperature degradation rating, or if the electrical or pneumatic supply has been disconnected, the damper will close and remain closed regardless of any (MCS) position.

FRAMING DETAILS (METAL OR WOOD 1 HOUR AND 2 HOUR RATED BARRIERS)

**Section A-A****Section B-B**
(1 Hour Rated Fire Barrier)**Section B-B**
(2 Hour Rated Fire Barrier)**NOTES:**

1. These illustrated partition designs have successfully been tested in conjunction with 1-1/2 hour classified fire dampers, for additional designs, reference Underwriters Laboratories, Inc. Fire Resistance Directory. Specific framing requirements of openings may vary with the Local Authority that has jurisdiction. Specific framing requirements should be provided in the architectural and structural drawings.
2. Reference the damper's installation instructions regarding the approved method of attaching the damper to the sleeve, attaching the retaining angles to the sleeve, required expansion clearances, sleeve gauge, etc. Type of framing does not affect the stated required expansion clearance.
3. Gypsum panels surrounding the opening are to be fastened to all stud and runner flanges, 12" o.c. maximum.
4. When wooden studs are used, filler pieces must be installed around the entire opening. Filler pieces are optional when metal studs are used (consult local codes to determine if filler pieces are required). Filler pieces are to be double screwed (or nailed to wooden studs) on 12" max. centers to the web of runners and studs.
5. Double jamb studding shown and required when opening width or length exceeds 36". Single jamb studding acceptable for openings 36"W x 32"H and smaller.



One Side Retaining Installation

Combination Fire/Smoke Damper Models: FS1, FS2, FA1, FA2

Fire Damper Models: MD19, MA19, 119, D19

APPLICATION

This installation instruction is to be used as a supplement to II-FS (replacing note 6 on page 2) and II-119 (replacing Note 6 on page 2). The method described by these instructions is an alternate method of mounting classified dampers within a fire barrier using perimeter retaining angles on only one side of the barrier.

NOTES

1. One side retaining angles are only available for barriers rated for less than three hours.
2. Reference Table 1 for vertical installation allowable sizes and Table 2 for horizontal installation allowable sizes.
3. The closed plane of the blades must be within the plane of the wall.
4. For horizontal installations, the actuator must be on the top side of the floor.
5. Perimeter retaining angles shall increase in size, proportionately, so there will be a minimum of 1" overlap on the wall, including at the corners.
6. The angles shall be attached to both the damper and the barrier framing on all four sides of the barrier face.
7. The leg attached to the damper can turn away from or into the opening, so long as expansion clearance is properly maintained.
8. In metal frame construction (vertical installation only), the angles can be mounted under or over the gypsum board. In wood frame construction (vertical installation only), the angles must be mounted over the gypsum board.
9. The perimeter retaining angles shall be fastened to the damper with $\frac{3}{16}$ " diameter steel or stainless steel nuts and bolts or by tack welding with beads $\frac{1}{2}$ " \pm $\frac{1}{4}$ " in length or with #10 steel or stainless steel sheet metal screws or $\frac{3}{16}$ " steel or stainless steel pop rivets. All connections shall be spaced on 6" maximum centers and 3" maximum from each corner (a minimum of 2 fasteners are required per side).
10. For vertical installations, perimeter retaining angles shall be fastened to the barrier on 6" maximum centers and 3" maximum from each corner (a minimum of two fasteners are required per side). For horizontal installations, perimeter retaining angles shall be fastened to the barrier on 12" maximum centers and 6" maximum from each corner (a minimum of one fastener is required per side).
 - A. In masonry construction, $\frac{3}{16}$ " diameter "tapcon" or equal fasteners with a minimum of $1\frac{1}{2}$ " penetration are required.
 - B. In metal framed openings, fine thread drywall screws with a minimum of 1" penetration into the framing are required.
 - C. In wood framed openings, coarse thread drywall screws with a minimum of 1" penetration into the framing are required.
11. Perimeter retaining angles shall be a minimum of $1\frac{1}{2}$ " x $\frac{7}{8}$ " x 16-GA steel.
12. Corners of angles are not welded together for dampers with width or height dimensions exceeding 24". For dampers 24"W x 24"H or smaller, the corners of the perimeter mounting angles can be welded. Some local codes may not allow welded corners.
13. Perimeter retaining angles and their mounting fasteners are not typically supplied with the damper.
14. Attachment of these angles must not restrict operation of the damper.

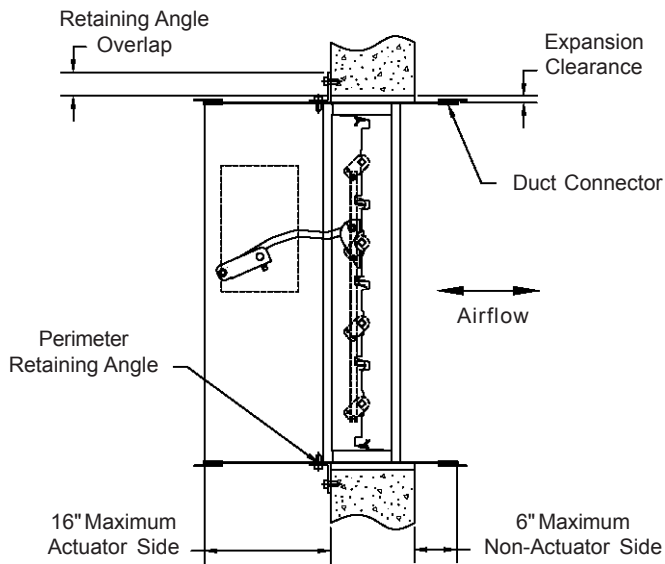
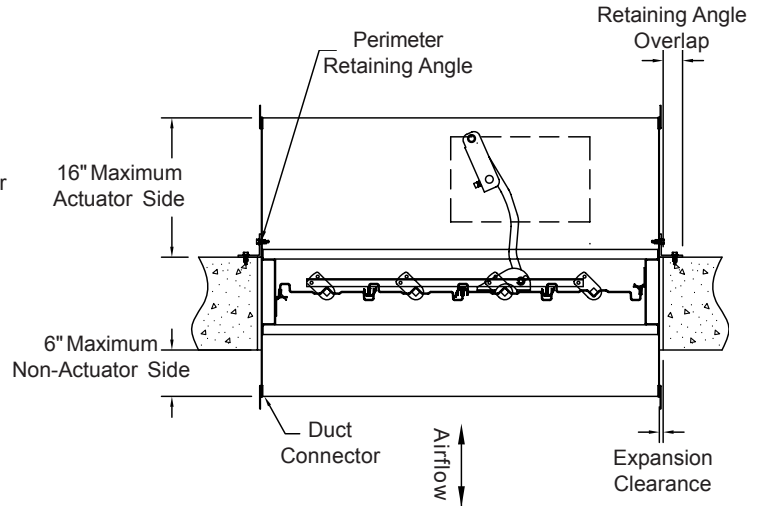
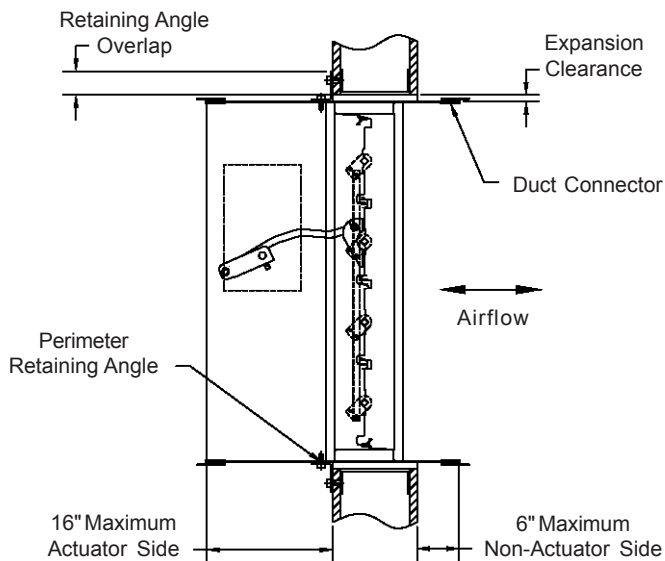
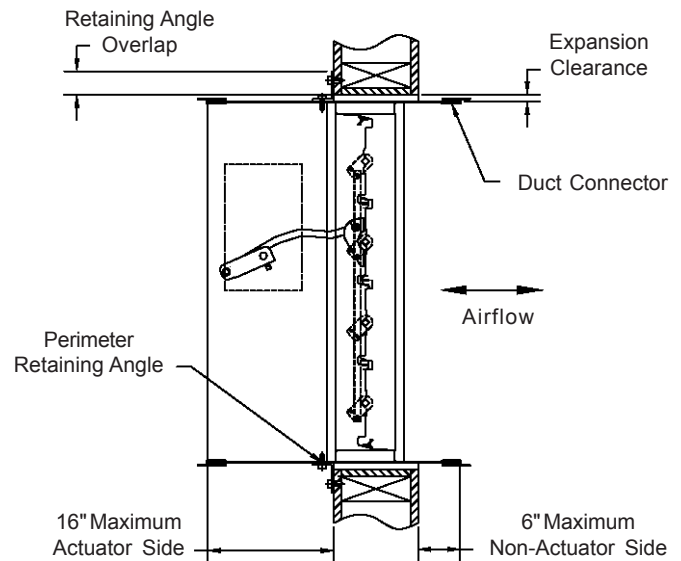
ONE SIDE SIZE LIMITATIONS

Table 1 (Vertical Installation)

		Construction		
		Masonry	Metal Frame	Wood Frame
Model	FS1, FS2	108"Wx44"H or 44"Wx70"H	108"Wx44"H or 44"Wx70"H	36"Wx48"H or 48"Wx36"H
	FA1, FA2	108"Wx44"H or 44"Wx96"H	108"Wx44"H or 44"Wx96"H	36"Wx48"H or 48"Wx36"H
	MD19	108"Wx44"H or 44"Wx60"H	108"Wx44"H or 44"Wx60"H	36"Wx48"H or 48"Wx36"H
	MA19	64"Wx36"H	64"Wx36"H	48"Wx36"H
	119	108"Wx44"H or 44"Wx108"H	108"Wx44"H or 44"Wx108"H	36"Wx48"H or 48"Wx36"H
	D19	72"Wx36"H	72"Wx36"H	36"Wx36"H

Table 2 (Horizontal Installation)

		Construction
		Masonry
Model	FS1, FS2	36"Wx42"H
	FA1, FA2	32"Wx42"H
	MD19	36"Wx42"H
	MA19	32"Wx42"H

Vertical, 1-Side Retaining, Masonry**Horizontal, 1-Side Retaining, Masonry****Vertical, 1-Side Retaining, Metal Stud****Vertical, 1-Side Retaining, Wood Stud**

Standard Installation

Fire/Smoke Corridor Dampers

APPLICATION

This UL Classified damper is approved and labeled for use in the following applications. This damper can be used as horizontally mounted, 1 hour rated Corridor damper. When used as a Corridor Damper, the installation instructions stated in this pamphlet apply. For sizes not exceeding 24"W x 24"H are also approved and labeled for use as a vertically mounted or horizontally mounted 1½ hour rated Fire/Smoke Damper. When used as a Fire/Smoke Damper, the closed plane of the damper blades must be within the floor or wall. When used as a Fire/Smoke Damper, the installation instructions stated by II-FS apply.

This Corridor Damper is Classified by Underwriters Laboratories for One Hour Fire Resistance and as a Class II 250°F Leakage Rated Damper to UL Standard 555S. This damper is to be mounted horizontally into ceilings of fire rated corridors where permitted by the Authority Having Jurisdiction. Minimum ceiling construction requirements are illustrated later in this booklet. This damper is supplied with a factory mounted actuator and is intended to close automatically when sensing elevated temperature or upon loss of electrical power. Damper will close within 15 seconds. If closed due to loss of electrical power, the damper will reopen when electrical power is restored. An aluminum or steel grille can be installed below the damper as long as the grille does not interfere with the closure of the damper.

PANEL SIZE LIMITATIONS

	Orientation	Horizontal & Vertical	
	Assembly	Min. Panel	Max. Panel
Model	FS2C, TG2C, MS2C, AS2C	8"W x 8"H	24"W x 24"H

INSTALLATION

Several methods of installing this damper are illustrated in this booklet. Depending on method chosen, expansion clearance and perimeter mounting angles may not be required. Regardless of installation method used, the damper frame is to be square and not distorted. Frame distortion can result in reduced leakage resistance or incomplete closure.

1. The installation of the damper and all duct connections to the damper sleeve shall conform to NFPA 80 and 90A and the SMACNA Fire, Smoke and Radiation Damper Installation Guide. All duct connections shall also conform to UL555.
2. Sleeves shall be the same gauge or heavier as the duct to which it is attached. Gauges shall conform to SMACNA duct standards.
3. The damper is supplied with a factory attached sleeve. Duct connections to the sleeve will be either of the breakaway or rigid types that are listed below. The following determines if the connections are to be rigid or breakaway. For rigid type duct connections, sleeve shall be a minimum of 16-GA. Maximum sleeve thickness will not exceed 10-GA galvanized steel. Damper supplied with thinner sleeves will require a breakaway connection of the types listed in Note 5. The standard factory supplied sleeve is 20-GA galvanized steel and assumes that a breakaway type duct connection will be employed.
4. Duct connections not listed as breakaways (see note 5) shall be considered rigid. Breakaway joints shall have no more than two No. 10 sheet metal screws on each side and on the bottom. The screws shall penetrate both sides of the slip pocket. When a breakaway joint is used along the top and bottom duct connection, a flat drive slip no longer than 20" is permitted on the two sides.
5. The following breakaway duct-to-sleeve connections may be used: Plain "S" Slip, Double "S" Slip, Inside Slip Joint, Hemmed "S" Slip, Standing "S" Slip (Bar Reinforced), Standing "S" Slip (Angle Reinforced) and Standing "S" Slip (Alternate Bar).
6. All connecting ducts shall not be continuous but shall terminate at the fire damper sleeve. Connecting ducts are attached to the damper sleeve as instructed by Notes 3, 4, and 5.
7. Ducts connected to round or flat oval transitions are connected either with a 4" wide draw band or by attaching the duct to the factory supplied transition collar with a maximum of three equally spaced No. 10 sheet metal screws.
8. Various brands of manufactured flanged connections can be used as breakaway connections as long as they are installed as shown by Figure 5-2 of the 5th Edition of SMACNA's Fire, Smoke and Radiation Damper Installation Guide or supplemental instruction SI-ULFDC.

Standard Installation

Fire/Smoke Corridor Dampers

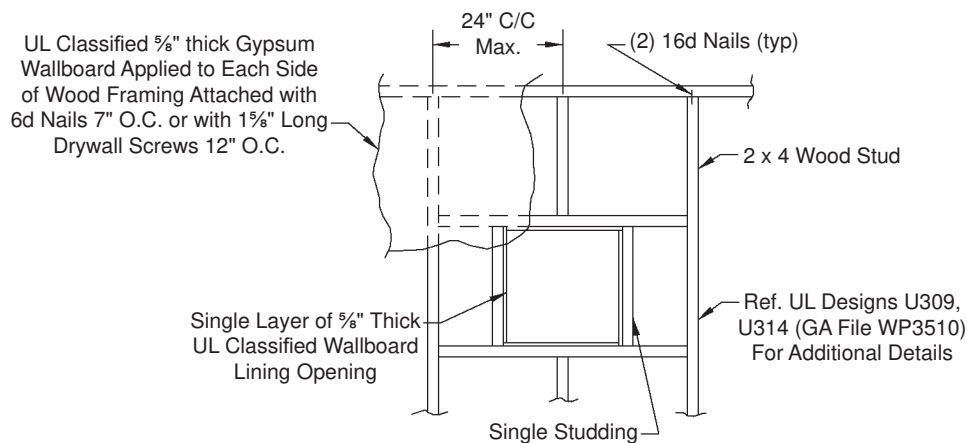
ELECTRICAL CONNECTIONS

**Electrical Connections and sequence of operations for fire/leakage rated Corridor Damper.
Damper supplied with one manually resettable thermal device.**

READ BEFORE INSTALLATION

1. Make sure that the electrical thermal device has been set. Simply push the red button located by the motor.
2. All wiring to be in accordance with N.E.C. (NFPA-70).
3. Identify actuator model number, check its operating voltage and current requirements. This information is shown on a label on or near the actuator.
4. Electrical supply is connected to terminals L1 and L2, reference wiring schematic. Connect the incoming ground to the wiring enclosure.
5. If a smoke detector or other sensing device is to be employed, it should be wired in series with L1 and the damper.
6. Circuit test:
 - A. Caution-when operating damper, keep fingers and clothing away from damper blades.
 - B. Make sure that the proper electrical power source has been supplied; 24VAC or 120VAC.
 - C. Apply power, the damper blades should open.
 - D. Disconnect power; the damper blades should close.
 - E. To check the electrical resettable thermo device;
 1. Apply electrical power (damper blades opened).
 2. Hold a lit match or lighter near the face of the thermal device. A faint click should be heard and the damper blades should close.
 3. After the thermal disc has cooled, push the red reset button and the damper blades should reopen.

WOOD FRAMING CONSTRUCTION (MIN. REQUIREMENTS)

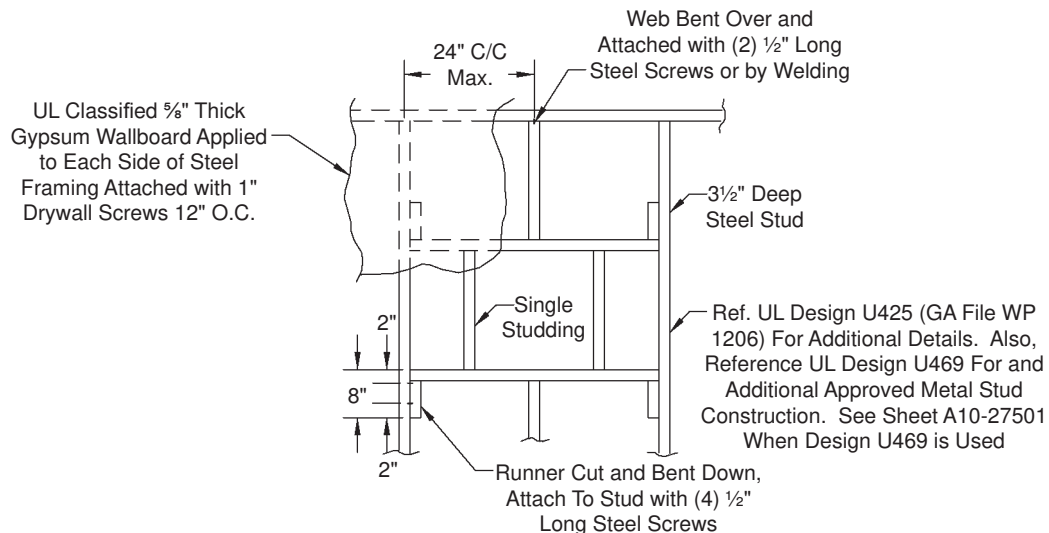


Standard Installation

Fire/Smoke Corridor Dampers

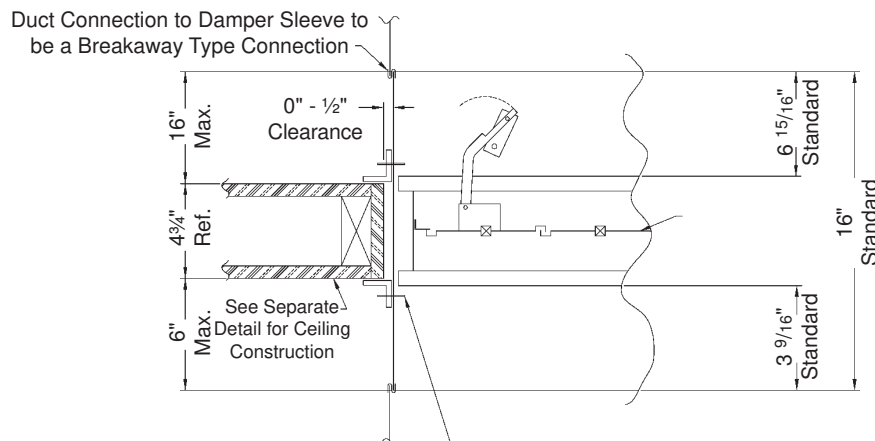
STEEL FRAMING CONSTRUCTION (MIN. REQUIREMENTS)

Note: If ceiling construction varies from details shown above, consult local Authority Having Jurisdiction (AHJ) or project Architect/Engineer for ceiling acceptance.



NON-FLANGED SLEEVE

- Notes: 1. Closed plane of damper blades must be within the ceiling or no more than $1\frac{1}{2}$ " away from the face of the ceiling.
2. Shown installed in wood framing. Installation in steel framing is similar.

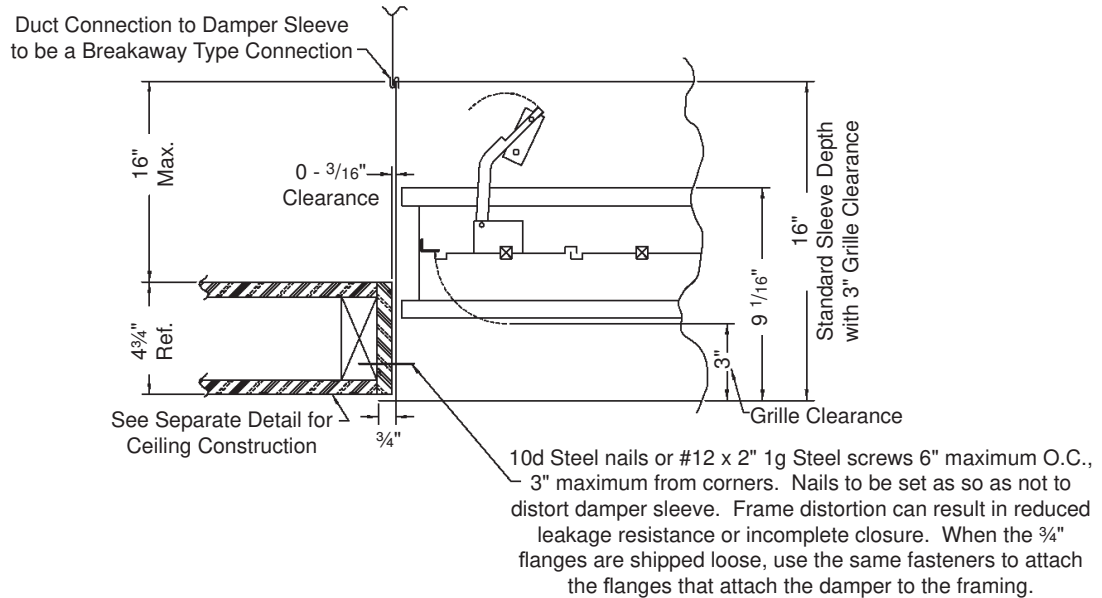


Fasten the perimeter mounting angles on all four sides of the damper to the sleeve only, with $\frac{1}{4}$ " dia. steel or stainless steel nuts and bolts or by tack welding with beads $\frac{1}{2}$ " \pm $\frac{1}{4}$ " in length or with #10 steel or stainless steel sheet metal screws or $\frac{3}{16}$ " steel or stainless steel pop rivets. All connections shall be spaced a max of 8" on center and shall have a connection not more than 3" from each corner. Perimeter mounting angles shall be a minimum of $\frac{7}{8}$ " x 1" x 16-GA steel and lap the ceiling by a minimum of 1". The corners of the perimeter mounting angles can be welded. Some local codes may not allow welded corners. Perimeter mounting angles and their mounting fasteners are not normally supplied with the damper. Attachment of these angles must not restrict operation of the damper.

Standard Installation Fire/Smoke Corridor Dampers

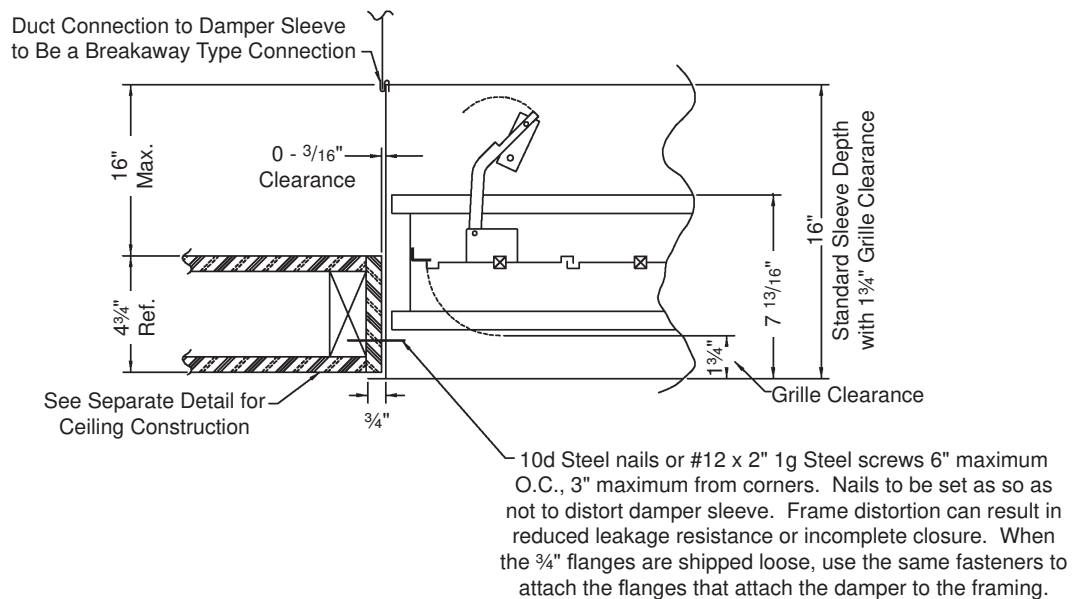
FLANGE EXPOSED, NO PERIMETER MOUNTING ANGLES, 3" GRILL CLEARANCE Not Approved for the City of Los Angeles

Note: Shown installed in wood framing installation in steel framing is similar. When steel framing, opening need not be lined with gypsum board. When steel framing and no opening lining, #12 x 1" long (minimum) steel sheet metal screws 6" maximum O.C., 3" maximum from corners. When steel framing and opening lining, screws to be 1½" minimum length.



FLANGE EXPOSED, NO PERIMETER MOUNTING ANGLES, 1 3/4" GRILL CLEARANCE Not Approved for the City of Los Angeles

Note: Shown installed in wood framing installation in steel framing is similar. When steel framing, opening need not be lined with gypsum board. When steel framing and no opening lining, #12 x 1" long (minimum) steel sheet metal screws 6" maximum O.C., 3" maximum from corners. When steel framing and opening lining, screws to be 1½" minimum length.

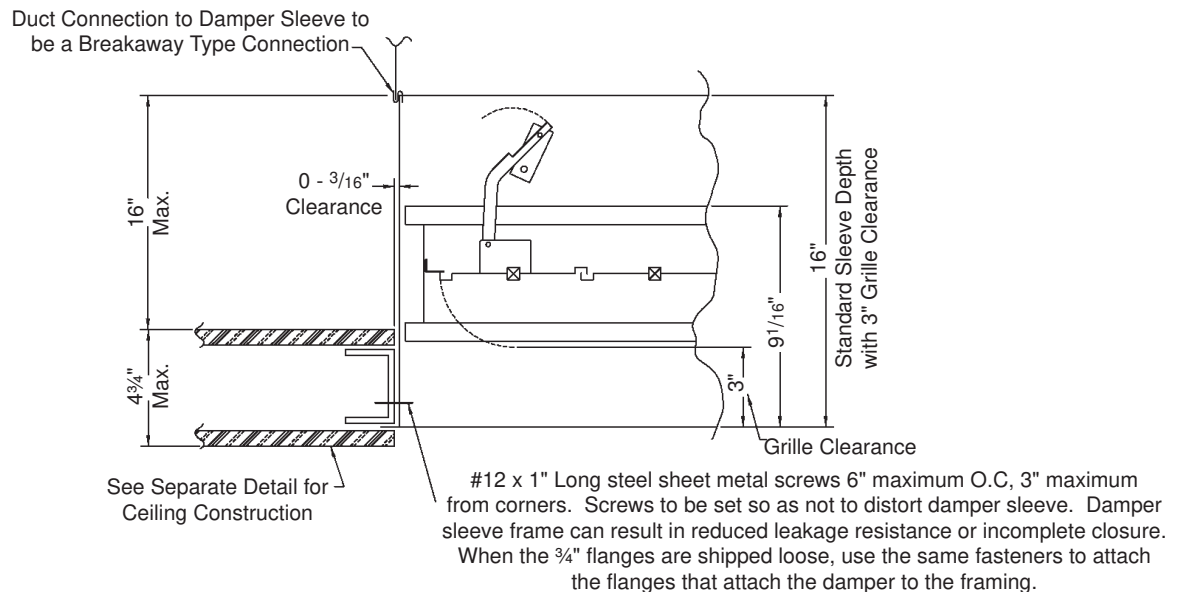


Standard Installation

Fire/Smoke Corridor Dampers

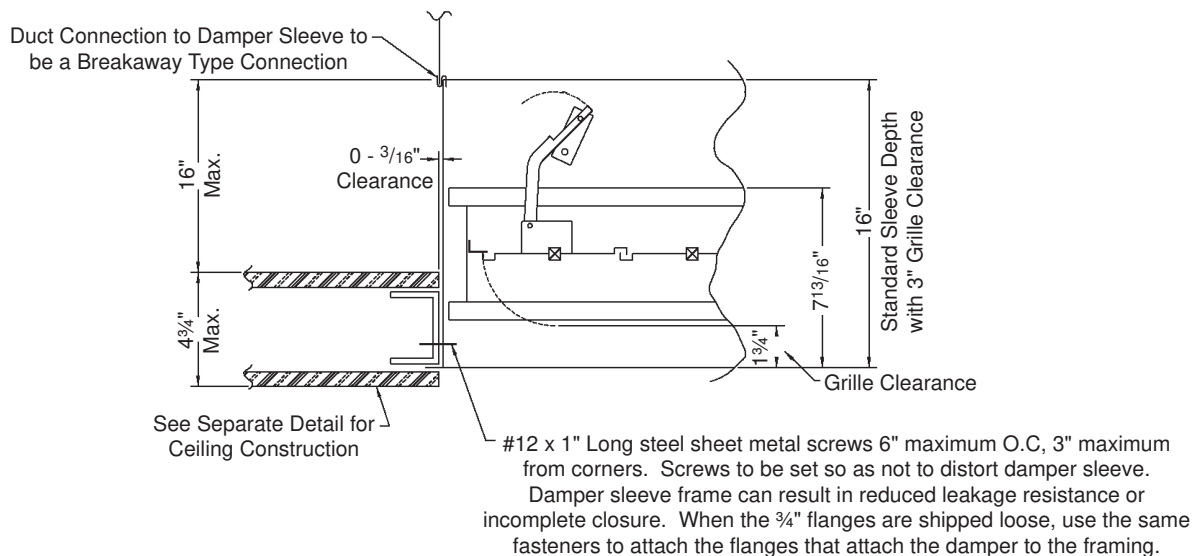
FLANGE CONCEALED, NO PERIMETER MOUNTING ANGLES, 3" GRILL CLEARANCE Not Approved for the City of Los Angeles

Note: Steel framing only, opening need not be lined with gypsum board. When steel framing and lining, damper attached to framing with #12 x 1½" long steel sheet metal screws 6" maximum O.C., 3" maximum from corners.



FLANGE CONCEALED, NO PERIMETER MOUNTING ANGLES, 1 3/4" GRILL CLEARANCE Not Approved for the City of Los Angeles

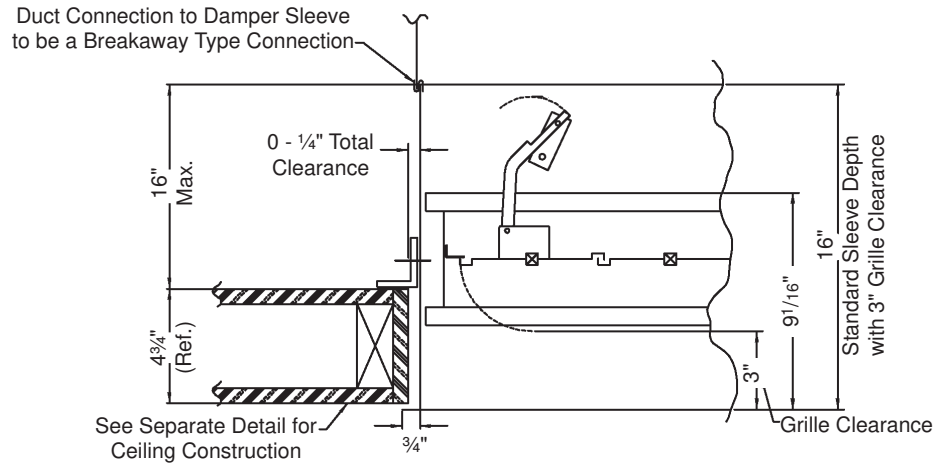
Note: Steel framing only, opening need not be lined with gypsum board. When steel framing and lining, damper attached to framing with #12 x 1½" long steel sheet metal screws 6" maximum O.C., 3" maximum from corners.



Standard Installation Fire/Smoke Corridor Dampers

FLANGE EXPOSED, PERIMETER MOUNTING ANGLES, 3" GRILL CLEARANCE

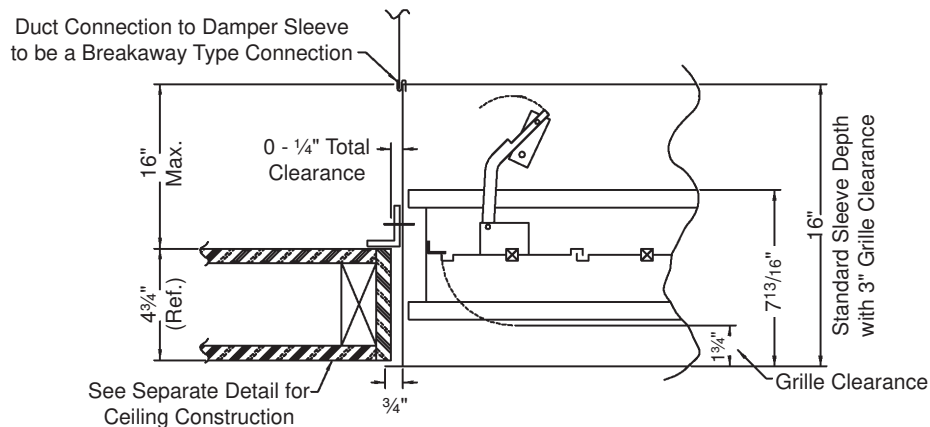
Note: Shown installed in wood framing. Installation in steel framing is similar.



Fasten the perimeter mounting angles on all four sides of the damper to the sleeve only, with $\frac{1}{4}$ " dia. steel or stainless steel nuts and bolts or by tack welding with beads $\frac{1}{2}" \pm \frac{1}{4}"$ in length or with #10 steel or stainless steel sheet metal screws or $\frac{3}{16}"$ steel or stainless steel pop rivets. All connections shall be spaced a maximum of 8" on center and shall have a connection of not more than 3" from each corner. Perimeter mounting angles shall be a minimum of $\frac{7}{8}" \times 1 \times 16$ -GA steel and lap the ceiling by a minimum of 1". The corners of the perimeter mounting angles can be welded. Perimeter angles and their mounting fasteners are not normally supplied with the damper. Attachment of these angles must not restrict operation of the damper.

FLANGE EXPOSED, PERIMETER MOUNTING ANGLES, 1 3/4" GRILL CLEARANCE

Note: Shown installed in wood framing. Installation in steel framing is similar.



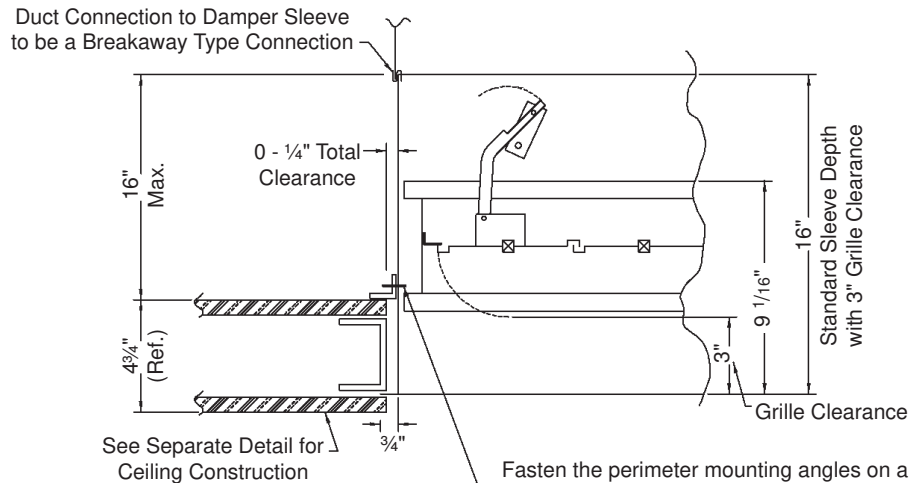
Fasten the perimeter mounting angles on all four sides of the damper to the sleeve only, with $\frac{1}{4}$ " dia. steel or stainless steel nuts and bolts or by tack welding with beads $\frac{1}{2}" \pm \frac{1}{4}"$ in length or with #10 steel or stainless steel sheet metal screws or $\frac{3}{16}"$ steel or stainless steel pop rivets. All connections shall be spaced a maximum of 8" on center and shall have a connection of not more than 3" from each corner. Perimeter mounting angles shall be a minimum of $\frac{7}{8}" \times 1 \times 16$ -GA steel and lap the ceiling by a minimum of 1". The corners of the perimeter mounting angles can be welded. Perimeter angles and their mounting fasteners are not normally supplied with the damper. Attachment of these angles must not restrict operation of the damper.

Standard Installation

Fire/Smoke Corridor Dampers

FLANGE CONCEALED, PERIMETER MOUNTING ANGLES, 3" GRILL CLEARANCE

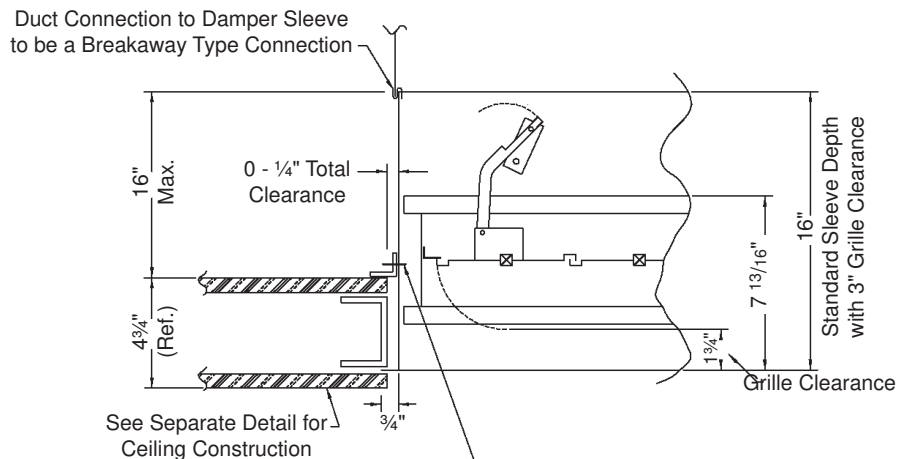
Note: Steel framing only. Opening need not be lined with gypsum board.



Fasten the perimeter mounting angles on all four sides of the damper to the sleeve only, with $\frac{1}{4}$ " dia. steel or stainless steel nuts and bolts or by tack welding with beads $\frac{1}{2}$ " \pm $\frac{1}{4}$ " in length or with #10 steel or stainless steel sheet metal screws or $\frac{3}{16}$ " steel or stainless steel pop rivets. All connections shall be spaced a maximum of 8" on center and shall have a connection of not more than 3" from each corner. Perimeter mounting angles shall be a minimum of $\frac{7}{8}$ " x 1 x 16-GA steel and lap the ceiling by a minimum of 1". The corners of the perimeter angles and their mounting fasteners are not normally supplied with the damper. Attachment of these angles must not restrict operation of the damper.

FLANGE CONCEALED, PERIMETER MOUNTING ANGLES, 1 3/4" GRILL CLEARANCE

Note: Steel framing only. Opening need not be lined with gypsum board.



Fasten the perimeter mounting angles on all four sides of the damper to the sleeve only, with $\frac{1}{4}$ " dia. steel or stainless steel nuts and bolts or by tack welding with beads $\frac{1}{2}$ " \pm $\frac{1}{4}$ " in length or with #10 steel or stainless steel sheet metal screws or $\frac{3}{16}$ " steel or stainless steel pop rivets. All connections shall be spaced a maximum of 8" on center and shall have a connection of not more than 3" from each corner. Perimeter mounting angles shall be a minimum of $\frac{7}{8}$ " x 1 x 16-GA steel and lap the ceiling by a minimum of 1". The corners of the perimeter angles and their mounting fasteners are not normally supplied with the damper. Attachment of these angles must not restrict operation of the damper.

Standard Installation

Fire/Smoke Corridor Dampers

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Standard Installation

Fire & Fire/Smoke Rated Front Access (Grille Mount) Dampers

APPLICATION

This UL Classified (see complete marking on product) multi-blade fire dampers and combination fire/smoke dampers have been tested with the damper out of the plane of the fire barrier. This arrangement allows for grille and grille/OBD assemblies to be flush mounted to the face of the fire barrier. Upon removal of the grille, the damper, damper actuator, and resetting of the heat responsive device are accessible.

This damper is intended to close automatically when sensing elevated temperature or upon loss of electrical power. If closed due to loss of electrical power, the damper will reopen when electrical power is restored.

- 1½ Hour Fire Rated, UL File R4708
- For Use in Dynamic or Static Systems
- Available in UL Leakage Class I or II (Combination Fire/Smoke Models)
- Factory Mounted Sleeve and Actuator
- 15 Second (maximum) Opening Time, Actuator Regulated Closure

PANEL SIZE LIMITATIONS

		Electric				
		Horizontal 250° or 350°		Vertical 250° or 350°		
		Min. Panel	Max. Panel	Min. Panel	Max. Panel	
Model	Assembly	FS1, GG1, MS1, AS1	16"W x 10"H	36"W x 42"H	16"W x 10"H	36"W x 42"H
	Assembly	FS2, GG2, MS2, AS2	10"W x 10"H	36"W x 42"H	10"W x 10"H	36"W x 42"H
	Assembly	FA1, CA1, MA1, UA1	12"W x 10"H	32"W x 42"H	12"W x 10"H	32"W x 42"H
	Assembly	FA2, CA2, MA2, UA2	10"W x 10"H	32"W x 42"H	10"W x 10"H	32"W x 42"H

		Non-Motorized			
		Horizontal		Vertical	
		Min. Panel	Max. Panel	Min. Panel	Max. Panel
Model	MD19, 15MD, 17MD, MD17	10"W x 10"H	36"W x 42"H	10"W x 10"H	36"W x 42"H
	MA19, 15MA, 17MA, MA17	10"W x 10"H	32"W x 42"H	10"W x 10"H	32"W x 42"H

Standard Installation

Fire & Fire/Smoke Rated Front Access (Grille Mount) Dampers

INSTALLATION

This damper is approved for vertical and horizontal installation. This damper can also be mounted into wood stud construction walls, **See Figure 3**. Blades must run horizontal when vertically mounted. When vertically mounted, this damper is required to be insulated on the top and two sides (the bottom is not insulated). This damper cannot be mounted up-side-down, reference "Top of Damper" label. When horizontally mounted, the damper must be mounted in a masonry/concrete floor, **See Figure 5**. The exterior of the sleeve is insulated on all four sides. Pinching, racking and other causes of frame distortion can result in reduced leakage resistance of incomplete closure.

Electrical wiring is to be in compliance with local codes and the National Electrical Code (NEC). Reference wiring diagram on damper, ensure that supply voltage matches actuator requirements. Damper and actuator must be tested prior to system start-up to ensure proper operation.

1. If the actuator is electrically energized yet the damper remains in the closed position, check that the reset button on the heat response device is depressed (disconnect power before resetting).

2. **Insulation** - The exterior of the damper sleeve is factory insulated. Care should be taken during installation to prevent ripping or other damage to the insulation.

3. **Opening Size** - No expansion clearance is required but sufficient clearance between the damper and the opening is required for the insulation and for mounting. The minimum opening width shall be $\frac{3}{8}$ " larger than the nominal width. The minimum opening height shall be $\frac{1}{4}$ " larger than the nominal height when vertically mounted. When horizontally mounted, the opening height shall be $\frac{3}{8}$ " larger than the nominal height. The maximum opening size shall be no more than $\frac{1}{4}$ " greater than the minimum opening size.

Example: An 18"W x 24"H nominal size damper, when mounted vertically, will require a minimum opening width of 18 $\frac{3}{8}$ " and a minimum opening height of 24 $\frac{1}{4}$ ". Note the preceding example is based on the standard 20-GA sleeve.

4. **Duct Mounting** - When duct work is connected to the non-flanged end of the damper sleeve, the following applies: Sleeves shall be steel of the same gauge or heavier as the duct to which it is attached. Sleeve gauge to be 20-GA min. 14-GA max. Connecting ducts shall not be continuous, but terminate at damper sleeve. Duct connections to the sleeve will be either of the breakaway or rigid types. The following determines if the connections are rigid or breakaway: For rigid type duct connections, sleeve shall be a minimum of 16-GA on dampers not exceeding 36"W or 24"H and 14-GA on larger units. The standard factory supplied sleeve is 20-GA galvanized steel and requires that a breakaway type duct connection will be employed. The following breakaway duct-to-sleeve connections may be used: Plain "S" Slip, Double "S" Slip, Inside Slip, Hemmed "S" Slip, Standing "S" Slip (Bar or Angle Reinforced), Standing "S" Slip (Alternate Bar). Various flanged connection systems are also approved as breakaway connections. Consult manufacturer's instructions for specific details.

5. **Sensotherm Reopenable Feature** - This feature allows the damper to be reopened from a remote switch (by others) after the low temperature heat responsive device has been activated.

Operation of optional reopenable (Sensotherm) feature:

A. Master Control Switch in closed position - the damper will close regardless of whether the thermal switch device has activated or not and regardless of the command from the smoke detector.

B. Master Control Switch in reopen position - if the damper has not been exposed to an elevated temperature higher than its rating, the damper will open. Also, the damper will open regardless of whether the low limit switch (either 165°F or 212°F) has actuated or not. If the damper has been exposed to an elevated temperature higher than its temperature degradation rating or if the electrical or pneumatic supply has been disconnected, the damper will close and remain closed regardless of a Master Control Switch position.

6. **Maintenance** - Damper shall be maintained in intervals as stated in NFPA 80, 90A and 92A unless local codes require more frequent inspections.

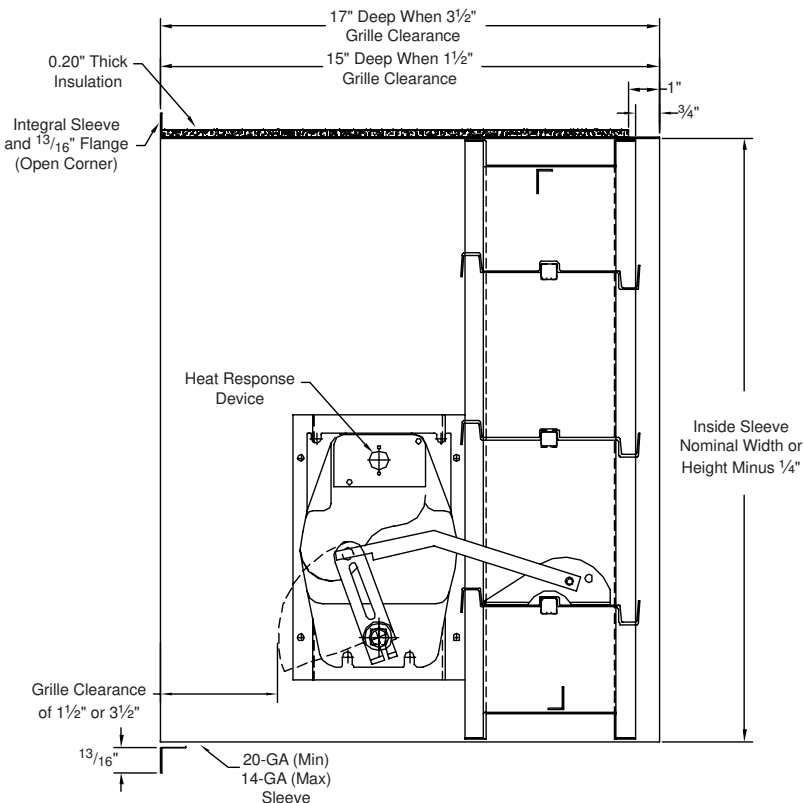


Figure 1

Standard Installation

Fire & Fire/Smoke Rated Front Access (Grille Mount) Dampers

Metal Stud or Masonry Wall Construction

In addition to the previously stated General Requirements, the following instructions pertain to block, masonry or metal stud construction. **See Figure 2 and Figure 5.**

7. **Grille** - A minimum 26-GA steel frame is required, core of grille can be aluminum or nonmetallic. If a thinner or non-steel grille frame is used, the open corners of flanged sleeve must be closed off with 20-GA minimum corner tabs (by others) riveted to flanges. When the flanges are not continuous but formed by a series of flange clips, grille flange must be steel of a minimum thickness of 26-GA. **See Figure 4.**

8. **Mounting Damper to Opening** - Unlike traditional fire damper installations, this damper requires no perimeter retaining angles. To mount the damper, insert the damper into the opening until the flange contacts the wall face, **See Note 3** for proper opening sizing. Through the grille clearance area of the sleeve, secure the damper to the steel wall stud framing using #10 steel S.M.S. 12" O.C. (maximum), 6" (maximum) from each corner, minimum of one fastener per each side, bottom and top. For masonry construction, use #10 x 1¼ (minimum) steel concrete screws or anchors (same spacing as for steel stud construction). Follow masonry anchor manufacturer's recommendations for minimum distance from edge.

Wood Stud Wall Construction

In addition to the previously stated General Requirements, the following instructions pertain to wood stud construction walls. **See Figure 3.**

9. **Grille** - A minimum 26-GA steel frame is required, core of grille can be aluminum or nonmetallic. If a thinner or non-steel grille frame is used, then open the corners of flanged sleeve must be closed off with 20-GA (minimum) corner tabs (by others) riveted to flanges. Grille is attached to either the sleeve flange or to the wood framing with steel screws 10" maximum on center.

10. **Mounting** - The damper is retained in the opening by the front sleeve flange and rear retaining angles. Rear perimeter retaining angles to be a minimum size of 1½" x 1½" x 16-GA steel or Mestek CDLG supplied 1½" x 7⁄8" x 16-GA steel "Tab-Lock" retaining angles. Angles are attached to the damper sleeve using #10 steel sheet metal screws or 13⁄16" steel rivets at 6" maximum on-center.

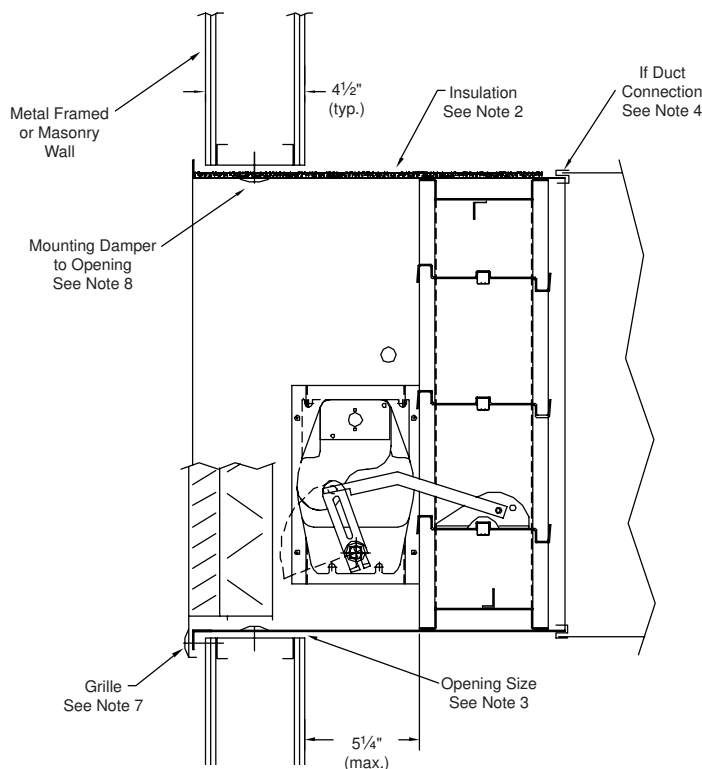


Figure 2

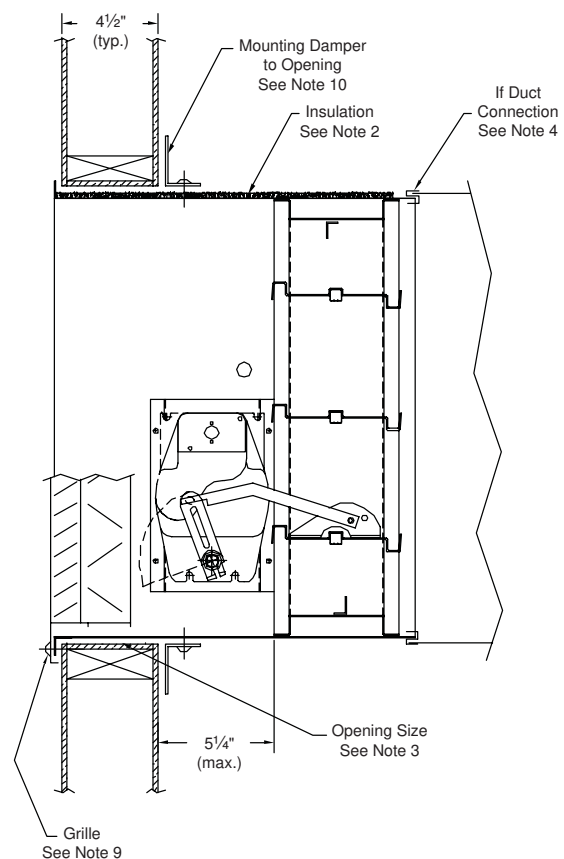


Figure 3

Standard Installation

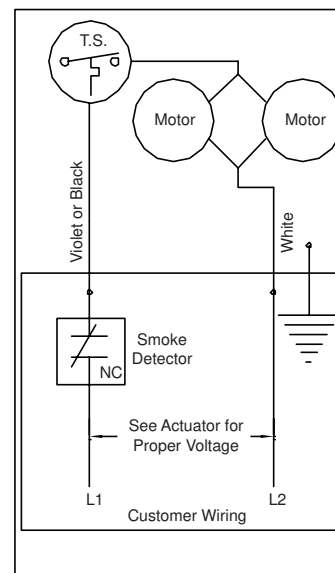


Diagram illustrating the installation of a Fire or Fire/Smoke Damper in a duct. The damper is shown in a closed position, preventing fire or smoke from passing through the duct. The damper is labeled "Fire or Fire/Smoke Damper". The duct is shown with a vertical section and a horizontal section. The damper is installed in the horizontal section of the duct. The damper is shown in a closed position, preventing fire or smoke from passing through the duct. The damper is labeled "Fire or Fire/Smoke Damper".

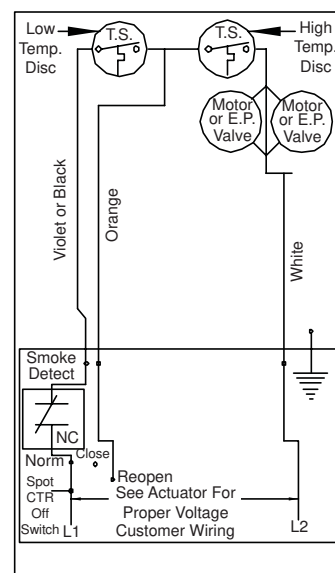
Note: When mounted horizontally,
floor must be of Masonry.



Figure 5



For use on dampers with one heat response device (non-reopenable).



Damper with two heat response devices
(reopenable).

Wiring Schematic

Standard Installation

Duct Smoke Detectors Mounted on Combination Fire/Smoke or Smoke Dampers

ASSEMBLY APPROVAL

Underwriters Laboratories Inc. does not have a separate Product Category for factory mounted dampers/smoke detector assemblies. Individually the smoke detector and the damper have been evaluated by their applicable UL Standards. It is the responsibility of the Local Authority Having Jurisdiction to determine the appropriateness of the smoke detector/damper assembly taking into consideration design velocities during an incident condition and obstructions/duct fittings in proximity of the smoke detector.

PURPOSE OF DUCT SMOKE DETECTION

National and local safety standards and codes recognize the ability of air duct systems to transfer smoke, toxic gases, and flame from area to area. Sometimes smoke can be of such quantity as to be a serious hazard to life safety unless blowers are shut down and dampers are actuated. The primary purpose of duct smoke detection, then, is to prevent injury, panic, and property damage by reducing the spread (recirculation) of smoke. Duct smoke detection can also serve to protect the air conditioning system itself from fire and smoke damage. Consult NFPA90A, NFPA72 and Local Codes to determine where smoke detectors are required.

To avoid stratification, detector placement should be such that there is a uniform air flow through the duct. Per NFPA72, detectors should be at least six duct widths downstream from any duct openings, sharp bends or branch connectors.

DAMPERS AVAILABLE

The smoke detector models listed below can be provided with any of the following combination fire/smoke dampers or smoke dampers:

Single Thickness & Airfoil Bladed,
1½ & 3 Hour Rated Fire/Smoke,
Corridor Fire/Smoke,
Airfoil & Single Thickness Smoke Only Models

The detector can be provided one of two different ways. The detector can be factory mounted to the sleeve of the damper and factory wired to the damper actuator. When factory wired, the damper will travel to the "fail" position when the detector senses smoke (electrical power disconnected). The detector can also be factory mounted to the sleeve of the damper but not wired to the damper actuator. **NOTE:** Model 2151 must be factory wired.

DUCT DETECTORS AVAILABLE

Two models of detectors are offered, each with specific application requirements.

Damper Type	Minimum Sleeve Depth
Fire/Smoke	19"
Smoke	18"
Grille Access Riser	16" (with 1½" Setback)
	18" (with 3½" Setback)
Corridor	16¼" (with 1¾" Setback)
	17½" (with 3" Setback or with no ¾ Flanges)
Note: Additional sleeve length added to actuator (detector) side.	

Minimum Damper Height	
No Flow Rated 2151	12"
Flow Rated SMP501	10"

*Optional Shipped Loose SMP501
Has No Min Height Restriction.

Standard Installation

Duct Smoke Detectors Mounted on Combination Fire/Smoke or Smoke Dampers

External Duct Mounted -- Model SM-501P

This photoelectronic detector mounts externally to the duct with intake and exhaust sampling tubes penetrating into the duct. This detector is recommended for ducts, 6" and wider with duct velocities within the 500 fpm to 4000 fpm range. Since this smoke detector is not rated for use at velocities below 500 fpm, local code may require an alternate means of damper closure such as zone detection or automated damper closure when the system fan is shut down. The Local Authority Having Jurisdiction should be consulted prior to the installation of the damper and smoke detector. For proper air sampling, duct pressure should be a minimum of 0.01 inches of water. Standard location when factory mounted will be on the side opposite the damper actuator. The inlet sampling tube is to be located between blades to avoid blockage of the air flow past the tube. If the detector is to be mounted on the actuator side then a longer damper sleeve must be specified at time of order. **NOTE:** The damper sleeve can extend no more than 16" beyond the face of the fire barrier. Inlet sampling tube length and orientation are critical for proper functioning. The inlet holes in the sampling tube must face into the air flow. The orientation of the inlet tube can be easily site rotated for proper air flow orientation.

Inlet Sampling Tube Length Requirements:

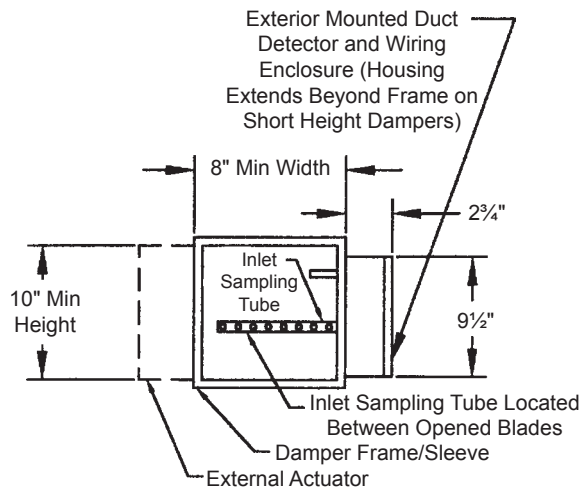
- A. The inlet sampling tube must span the duct width. Duct widths must be known at time of order to insure that the proper length of inlet sampling tube will be provided. See table below for appropriate sampling tube part number.
- B. Insure that the red end cap is installed in the end of the inlet sampling tube.
- C. For tubes longer than the width of the duct, the tube should extend out of the opposite side of the duct. Trim the tube so two inches maximum extend outside of the duct with the extended end plugged and tape close any holes in the protruding section of the tube.

GENERAL DESCRIPTION/SPECIFICATIONS

Type: Photoelectronic SM-501-P
 Velocity Range: 500 - 4000 fpm
 Operating Temp Range: 32°F to 140°F
 Operating Humidity Range: 10% to 85% R.H.
 Nominal Voltage: 230 VAC 50-60 Hz., 115 VAC 50-60 Hz.,
 24 VDC 50-60 Hz., 24 VAC 50-60 Hz.
 Contact Ratings: Alarm: 2 Sets of Form "C" Rated @ 10 Amps @ 115 VAC
 Trouble: 1 Set of Form "C" Rated @ 10 Amps @ 115 VAC
 Agency Listings: UL268A; UROX. S2839
 MEA Listed: 73-92-EX; Vol. 20
 CSFM 3240-1004:108

ADDITIONAL INFORMATION

Reference smoke detector manufacturer's instructions packaged with each detector for specific wiring instructions, maintenance and testing information. The model SM-501-P detector housing cover must be securely fastened to complete the air-tight enclosure for proper air sampling.



Model SM-501-P

Duct Width	Inlet Sampling Tube Model
6" - 12"	STS - 1.0
12" - 30"	STS - 2.5
30" - 60"	STS - 5.0
60" - 120"	STS - 10.0



MESTEK, INC.
 Commercial Damper/Louver Group

Standard Installation

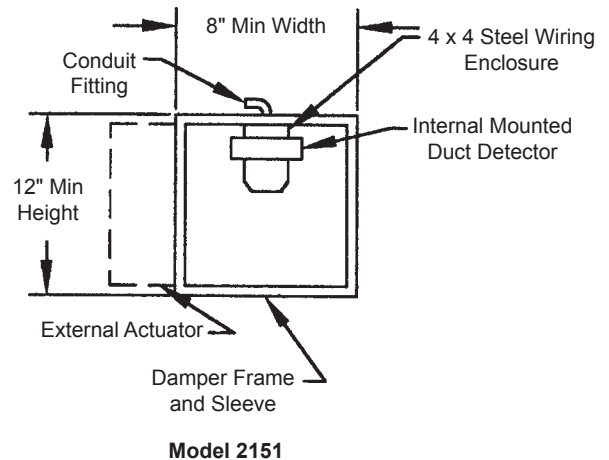
Duct Smoke Detectors Mounted on Combination Fire/Smoke or Smoke Dampers

Internal Duct Mounted -- Model 2151

This photoelectronic detector mounts internally within ducts up to 18" in width. Since this detector is mounted within the duct, NFPA requires that means must be provided to monitor and test this detector from outside of the duct. To accomplish this requirement, a remote test station (Model RTS451) and a remote test coil kit (Model RTC100) are provided, reference separate instructions and the wiring schematic contained within this booklet. Duct velocity can range from 0 - 3000 fpm. For ducts wider than 18" with velocities less than 500 fpm, it is recommended that multiple detectors 18" maximum on center be installed. Standard location when factory mounted will be the top inside of the damper sleeve.

GENERAL DESCRIPTION/SPECIFICATIONS

Type:	Photoelectronic
Velocity Range:	0 - 3000 fpm
Operating Temp Range:	32°F to 120°F
Operating Humidity Range:	10% to 93% R.H.
Nominal Voltage:	120 VAC (Requires Base No. B114LP)
Remote Testing:	Requires Remote Test Station RTS451 and Remote Test Coil Kit RTC100 for Each Model 2151 Detector
Contact Ratings:	See Information Provided with Each Detector
Agency Listings:	UL268A; File S911 (N) (Requires Remote Test Coil) RR 8281 (City of Los Angeles) CSFM 7272-1209:159



ADDITIONAL INFORMATION

Reference smoke detector manufacturer's instructions packaged with each detector for specific wiring instructions, maintenance and testing information.

TEST AND MAINTENANCE

Reference smoke detector manufacturers' instructions on field testing and recommended/required maintenance.

ADDITIONAL INSTALLATION REQUIREMENTS

These devices will not operate without electrical power. The Model SM-501-P detector housing is not weather proof and if specified, requires the WP-1 NEMA 3R weatherproof enclosure. Location of the detector must not interfere with the movement of the damper blades or the damper linkage. All wiring must be installed in compliance with the National Electrical Code and the local codes having jurisdiction. For signal wiring (the wiring between detectors or from detectors to auxiliary devices), it is usually recommended that single-conductor wire be no smaller than 18 AWG. The detector terminals accommodate wire sizes up to 14 AWG. When a smoke detector is controlling a damper driven with a pneumatic actuator, the pneumatic actuator must be controlled by an E/P valve (solenoid).

MAINTENANCE AND SERVICE OF DUCT DETECTORS

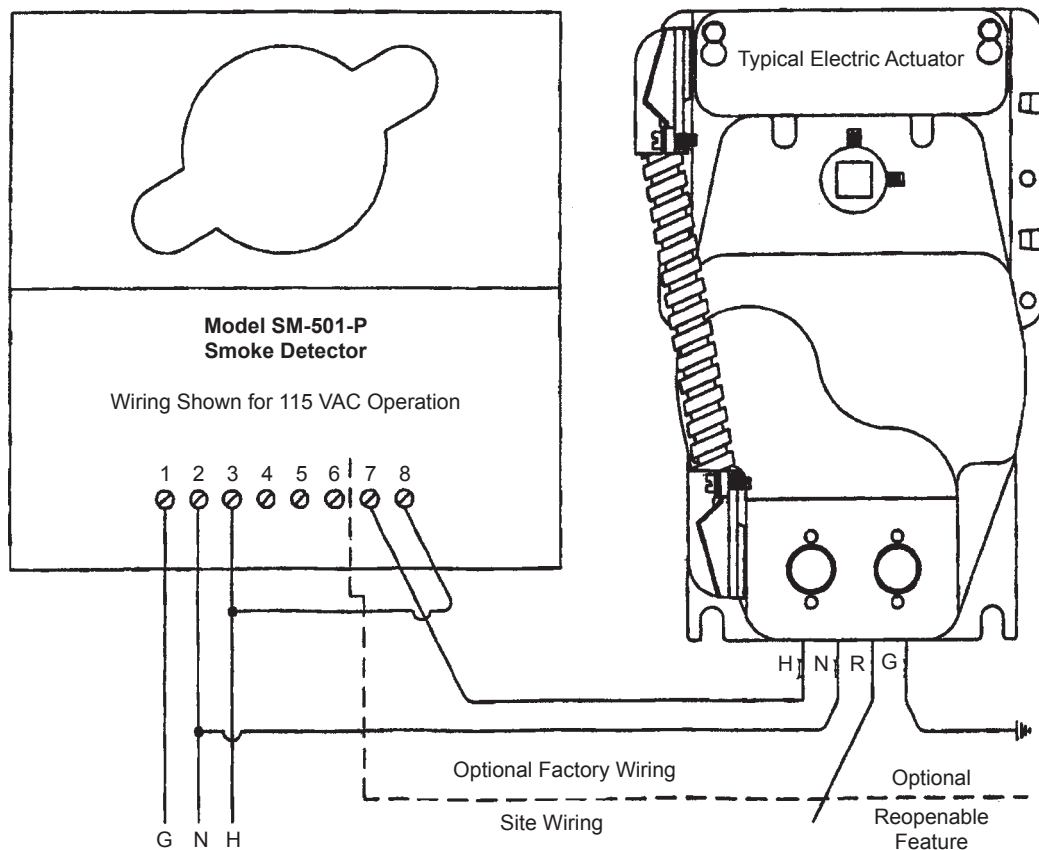
Smoke detectors are designed to be as maintenance free as possible. However, dust, dirt and other foreign matter can accumulate inside a detector and change its sensitivity; this is especially true with duct type smoke detectors. They can become more sensitive, which may cause unwanted alarms, or less sensitive, which may reduce the level of protection. Both are undesirable. Therefore, detectors should be tested periodically and maintained at regular intervals. Refer to Section 4-3 and Appendix B of NFPA-90A, Chapter 7 of NFPA 72E.

TYPICAL MAINTENANCE PRACTICES

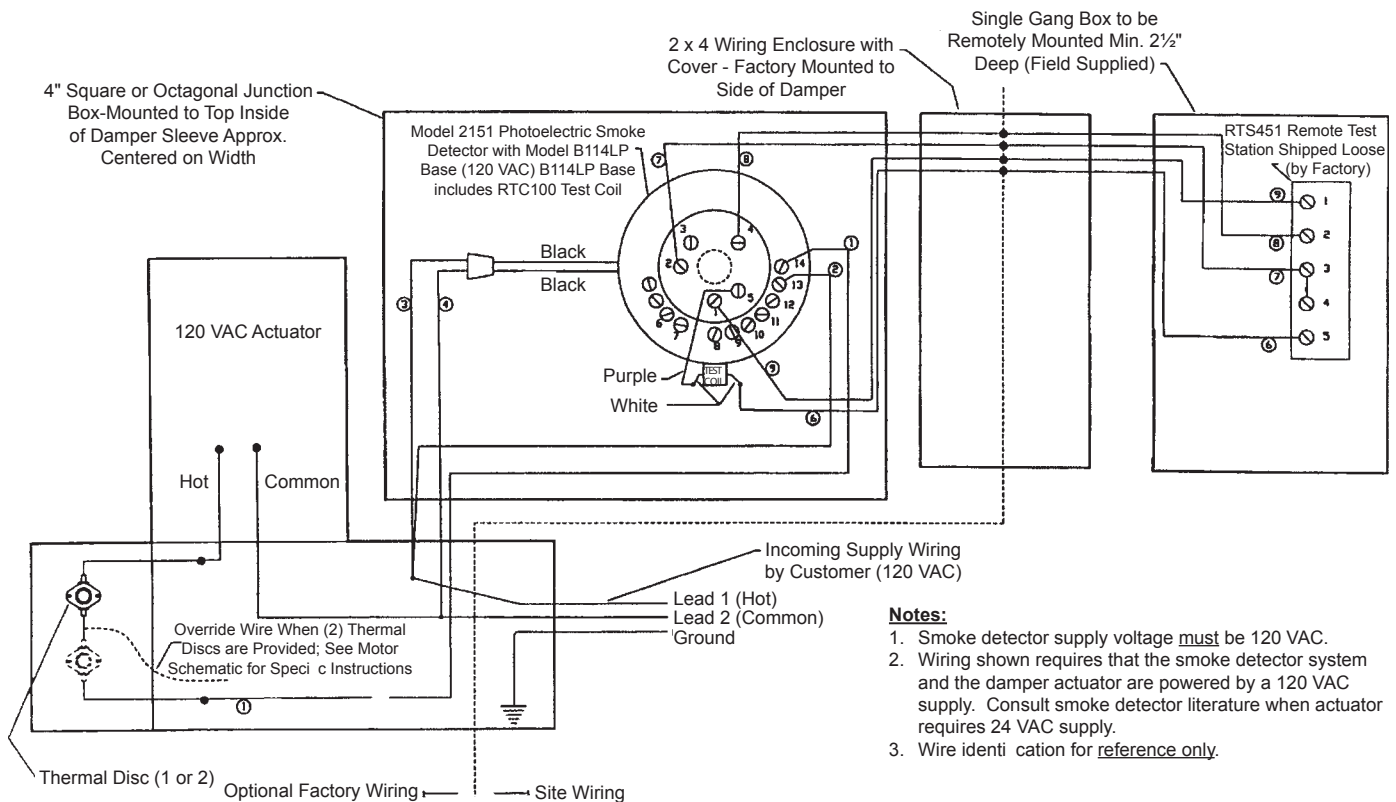
Each installation location must be assessed on its own merits. If the protected area is of a very dirty nature, then the duct units will have to be checked and cleaned on a quarterly basis or when cleaning is required. As a guideline, the detector head should be cleaned every six months or as required. Notify the proper authorities that the smoke detector system is undergoing maintenance, and therefore the system will be temporarily out of service. **CAUTION:** Disable the zone or system undergoing maintenance to prevent unwanted alarms and possible dispatch of the fire department. The methods of cleaning are to vacuum the detector head thoroughly or to blow the detector head out using compressed air. Do not use chemicals to clean the detector head as this could contaminate the detector head and damage the casing. Sampling tubes must be inspected and cleaned in accordance with the schedule as determined above, to allow the free flow of air through the sensing tube. Reference instructions packaged with each detector for specific maintenance and testing information.

Standard Installation

Duct Smoke Detectors Mounted on Combination Fire/Smoke or Smoke Dampers



Model 2151



MESTEK, INC.
Commercial Damper/Louver Group

Standard Installation

Smoke Damper Models: S1, S2, SA1, SA2

APPLICATION

These dynamically rated smoke dampers are intended to restrict the passage of smoke. This smoke damper may be mounted in the vertical or horizontal position with the damper blades running horizontally. Airflow can be from either direction. When mounted in the vertical position, the damper may be mounted right side up or upside down. It can be mounted within the plane of a smoke barrier, but can also be mounted out of the plane of a smoke barrier. When mounted out of the plane of the smoke barrier, it is to be installed within 24" of the barrier and before any duct inlets or outlets.

MULTIPLE PANEL SIZE LIMITATIONS

Actuation		Electric		
Orientation		Horizontal & Vertical		
Assembly		Max Panel	Max Assy 250°	Max Assy 350°
Model	S1, S2	36"Wx48"H 48"Wx36"H	144"Wx70"H 288"Wx35"H	128"Wx62"H 256"Wx31"H
	SA1, SA2	36"Wx48"H	144"Wx96"H 288"Wx48"H	144"Wx96"H 288"Wx48"H

Actuation		Pneumatic		
Orientation		Horizontal & Vertical		
Assembly		Max Panel	Max Assy 250°	Max Assy 350°
Model	S1, S2	36"Wx48"H	108"Wx36"H	108"Wx36"H
	SA1, SA2	36"Wx48"H	144"Wx96"H 288"Wx48"H	144"Wx96"H 288"Wx48"H

SUPPLEMENTAL INSTALLATION INSTRUCTIONS / SUBMITTAL DATA

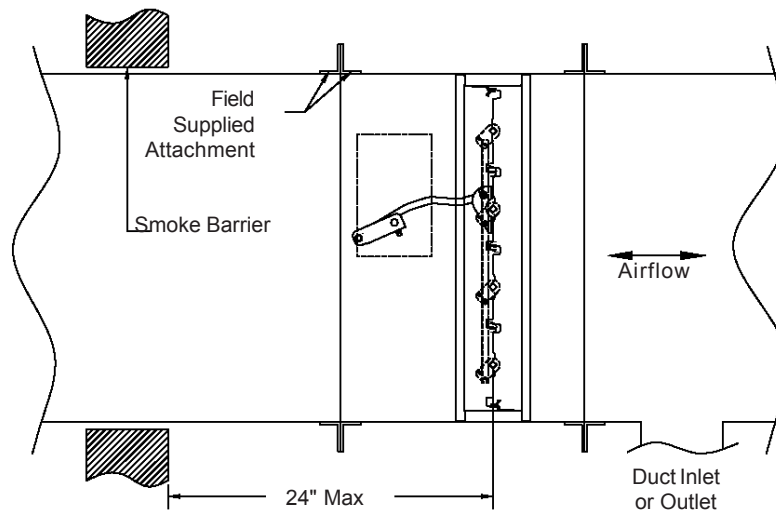
Sleeve Extension
Integral Duct Access Door
Integral Dual Position Indication (SD-IDPI)
Flow-Rated Smoke Detector (SM-501)
No-Flow Smoke Detector (2151)
Transitions (SD-TRFS)
Sleeves (SD-SLVS)

INSTALLATION

1. **General:** The installation of the damper shall conform to NFPA-90A and the SMACNA Fire, Smoke and Radiation Damper Installation Guide.
2. **Actuators:** Dampers must be supplied with factory mounted actuators and are intended to close automatically upon loss of electrical power or release of air pressure and is to be controlled by a smoke detector.
3. **Multiple Panel / Multiple Section Assembly:** Large damper assembly sizes may require multiple factory assembled modules that ship separately. Refer to page 3 for details.
4. **Sleeves:** Sleeve are not required as dampers can be installed into continuous ductwork. Dampers with factory mounted external actuators can be supplied without sleeves, but require sideplates. Dampers with factory mounted internal actuators can be supplied without sleeves or sideplates. Sleeves shall be the same gauge or heavier as the duct to which it is attached. Gauges shall conform to SMACNA or ASHRAE duct standards. A field supplied sleeve is attached to the damper frame with $\frac{3}{16}$ " diameter steel rivets, $\frac{1}{4}$ " diameter steel bolts, #10 steel sheet metal screws, or $\frac{1}{2}$ " long welds. Fasteners shall be staggered on each side of the damper frame on 6" maximum centers and 3- $\frac{1}{2}$ " maximum from each corner. For Class I Smoke dampers, approved caulking (reference note 6) shall be applied along the perimeter between the sleeve and the damper on both sides. For Class II Smoke dampers, approved caulking (reference note 6) shall be applied along the perimeter between the sleeve and the damper on only one side.
5. **Attachment:** For dampers without sleeves, use metal shims, if required, between the damper frame and ductwork to prevent distortion. The damper is to be anchored to the ductwork along the perimeter on both sides of the hat channel frame.
6. **Caulking:** Caulk shall be one of the following: Dow Corning RTV732, Silco Sil-Bond RTV 4500, General Electric IS808, or Novagard RTV300. For Class I dampers, approved caulking shall be applied along the perimeter between the sleeve/ductwork and frame on both sides. For Class II dampers, approved caulking shall be applied along the perimeter between the sleeve/ductwork and frame on only one side.
7. **Maintenance:** Dampers shall be maintained at intervals as stated in NFPA 90A and 92A. Local codes or building conditions may require more frequent inspections and maintenance.

STANDARD MOUNTING DETAILS

Smoke Only, Vertical or Horizontal



MULTIPLE PANEL / MULTIPLE SECTION INSTALLATION DETAILS

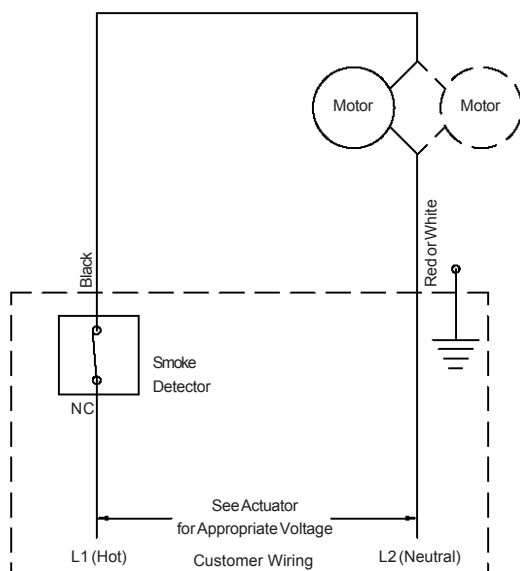
Smoke Dampers (Models S1, S2, SA1, SA2)

1. Damper assemblies ordered without factory mounted sleeves are limited in size, so that the entire assembly ships as a single section.
2. Multiple panel high damper assemblies are electrically/pneumatically, but not mechanically linked between top and bottom panels if assembled within a common sleeve. Large sizes may require multiple sleeve sections - multiple sleeve sections are not mechanically or electrically/pneumatically linked.
3. Multiple panel wide damper assemblies are mechanically and electrically/pneumatically linked if assembled within a common sleeve. Large sizes may require multiple sleeve sections - multiple sleeve sections are not mechanically or electrically/pneumatically linked.
4. Damper assembly sections that are not mechanically or electrically/pneumatically linked each have their own supply connection point, such that they operate independently. Multiple actuators within a linked section are factory wired/plumbed together.
5. Damper assembly sections that are mechanically and electrically/pneumatically linked share a single supply connection point. Multiple actuators within a linked section are factory wired/plumbed together.
6. Damper assemblies that ship in multiple sections shall be fastened together using 1/4" diameter steel bolts, lockwashers, and nuts. Fasteners shall be on 6" maximum centers on both faces of the sleeve.

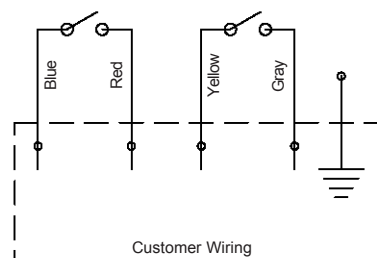
ELECTRIC WIRING SCHEMATICS

Notes

1. All wiring to be in accordance with N.E.C. (NFPA 70).
2. Refer to actuator label for appropriate voltage.
3. Connect incoming ground to the actuator assembly.



Integral Dual Position Indication (IDPI)



Integral Dual Position Indication (IDPI) Wiring Chart			
actuator mounting location	damper full open	damper full close	damper mid-stroke
	closed circuit		
external left	red / blue	yellow / gray	none
external right	yellow / gray	red / blue	none
internal left	yellow / gray	red / blue	none
internal right	red / blue	yellow / gray	none

* This wiring is opposite if the actuator is rotated 90°, so that it is parallel to the duct.

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Standard Installation

Smoke Damper Models: S1(SS), S2(SS)

APPLICATION

These dynamically rated stainless steel smoke dampers are intended to restrict the passage of smoke. This smoke damper may be mounted in the vertical or horizontal position with the damper blades running horizontally. Airflow can be from either direction. When mounted in the vertical position, the damper may be mounted right side up or upside down. It can be mounted within the plane of a smoke barrier, but can also be mounted out of the plane of a smoke barrier. When mounted out of the plane of the smoke barrier, it is to be installed within 24" of the barrier and before any duct inlets or outlets.

MULTIPLE PANEL SIZE LIMITATIONS

		Actuation	Electric			
		Orientation	Horizontal & Vertical			
		Assembly	Max Panel 250°	Max Panel 350°	Max Assy 250°	Max Assy 350°
Model		S1(SS)	36"Wx36"H	not available	108"Wx36"H	not available
		S2(SS)	36"Wx36"H	36"Wx36"H	108"Wx36"H	108"Wx36"H

		Actuation	Pneumatic			
		Orientation	Horizontal & Vertical			
		Assembly	Max Panel 250°	Max Panel 350°	Max Assy 250°	Max Assy 350°
Model		S1(SS)	36"Wx36"H	not available	108"Wx36"H	not available
		S2(SS)	36"Wx36"H	36"Wx36"H	108"Wx36"H	108"Wx36"H

SUPPLEMENTAL INSTALLATION INSTRUCTIONS / SUBMITTAL DATA

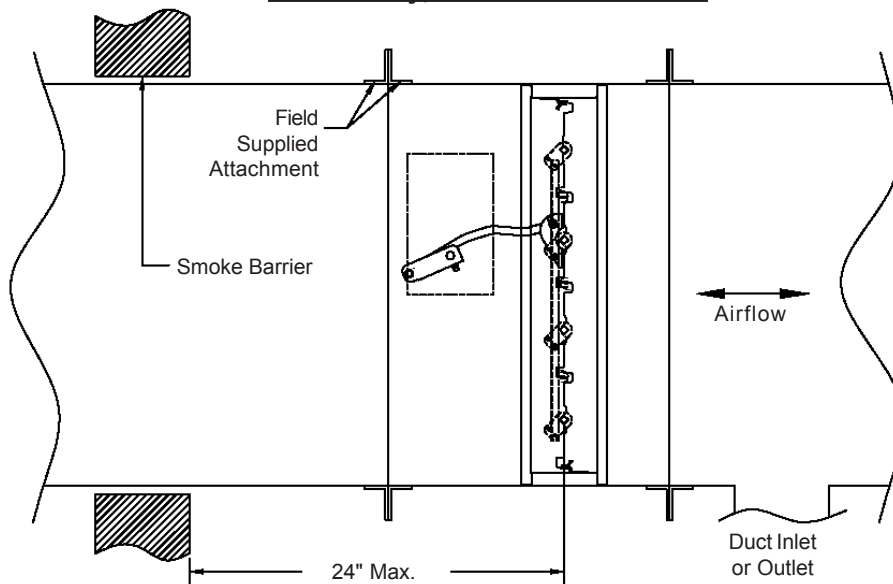
Sleeve Extension
Integral Duct Access Door
Integral Dual Position Indication (SD-IDPI)
Flow-Rated Smoke Detector (SM-501)
Transitions (SD-TRFS)
Sleeves (SD-SLVS)

INSTALLATION

1. **General:** The installation of the damper shall conform to NFPA-90A and the SMACNA Fire, Smoke and Radiation Damper Installation Guide.
2. **Actuators:** Dampers must be supplied with factory mounted actuators and are intended to close automatically upon loss of electrical power or release of air pressure and is to be controlled by a smoke detector.
3. **Multiple Panel / Multiple Section Assembly:** Refer to page 3 for details.
4. **Sleeves:** Sleeve are not required as dampers can be installed into continuous ductwork. Dampers with factory mounted external actuators can be supplied without sleeves, but require sideplates. Dampers with factory mounted internal actuators can be supplied without sleeves or sideplates. Sleeves shall be the same gauge or heavier as the duct to which it is attached. Gauges shall conform to SMACNA or ASHRAE duct standards. A field supplied sleeve is attached to the damper frame with $\frac{3}{16}$ " diameter stainless steel rivets, $\frac{1}{4}$ " diameter stainless steel bolts, #10 stainless steel sheet metal screws, or $\frac{1}{2}$ " long welds. Fasteners shall be staggered on each side of the damper frame on 6" maximum centers and 3- $\frac{1}{2}$ " maximum from each corner. For Class I Smoke dampers, approved caulking (reference note 6) shall be applied along the perimeter between the sleeve and the damper on both sides. For Class II Smoke dampers, approved caulking (reference note 6) shall be applied along the perimeter between the sleeve and the damper on only one side.
5. **Attachment:** For dampers without sleeves, use metal shims, if required, between the damper frame and ductwork to prevent distortion. The damper is to be anchored to the ductwork along the perimeter on both sides of the hat channel frame.
6. **Caulking:** Caulk shall be one of the following: Dow Corning RTV732, Silco Sil-Bond RTV 4500, General Electric IS808, or Novagard RTV300. For Class I dampers, approved caulking shall be applied along the perimeter between the sleeve/ductwork and frame on both sides. For Class II dampers, approved caulking shall be applied along the perimeter between the sleeve/ductwork and frame on only one side.
7. **Maintenance:** Dampers shall be maintained at intervals as stated in NFPA 90A and 92A. Local codes or building conditions may require more frequent inspections and maintenance.

STANDARD MOUNTING DETAILS

Smoke Only, Vertical or Horizontal



MULTIPLE PANEL / MULTIPLE SECTION INSTALLATION DETAILS

Smoke Dampers (Models S1(SS), S2(SS))

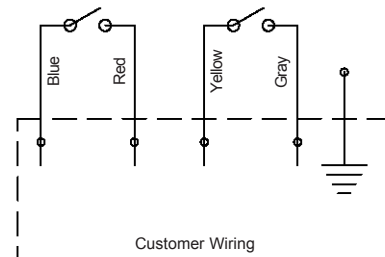
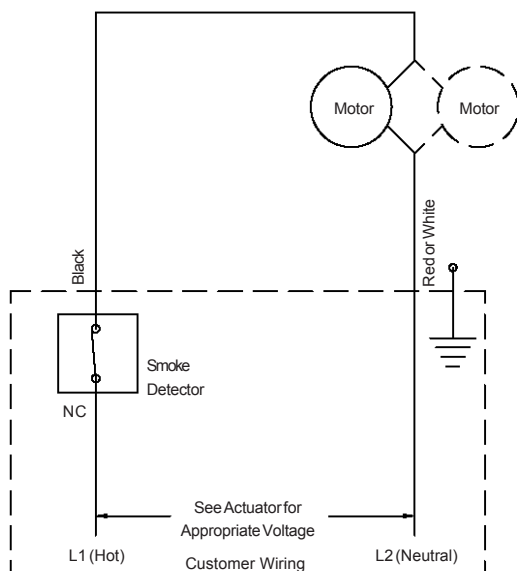
1. Damper assemblies ordered without factory mounted sleeves are limited in size, so that the entire assembly ships as a single section.
2. Multiple panel wide damper assemblies are mechanically and electrically/pneumatically linked.
3. Damper assembly sections that are mechanically and electrically/pneumatically linked share a single supply connection point. Multiple actuators within a linked section are factory wired/plumbed together.

ELECTRIC WIRING SCHEMATICS

Notes

1. All wiring to be in accordance with N.E.C. (NFPA 70).
2. Refer to actuator label for appropriate voltage.
3. Connect incoming ground to the actuator assembly.

Integral Dual Position Indication (IDPI)



Integral Dual Position Indication (IDPI) Wiring Chart			
actuator mounting location	damper full open	damper full close	damper mid-stroke
	closed circuit		
external left	red / blue	yellow / gray	none
external right	yellow / gray	red / blue	none
internal left	yellow / gray	red / blue	none
internal right	red / blue	yellow / gray	none

* This wiring is opposite if the actuator is rotated 90°, so that it is parallel to the duct.

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In the interest of product development, Air Balance reserves the right to make changes without notice.





Dampers



Louvers

UL Life Safety Products

Duct Access Doors

FSA100/101 — 1" Thick, Hinged/Cammed Access Door

FSAH — High Pressure Access Door

FSA w/Viewport — Plexiglass or Wireglass, Single or Double Pane Viewport

FSA w/Flange — Access Door with Flanged Frame

FSA w/Fiberglass Ductwork — Access Doors for Fiberglass Ductwork

Phone: 859-538-3400 Fax: 859-647-7810

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MODEL FSA

1" Deep • Duct Access Door

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 22-GA galvanized steel
DOOR PANEL: 24-GA galvanized steel
INSULATION: 1" fiberglass
PRE-FORMED TABS: 22-GA galvanized steel
FINISH: Mill

OPTIONS

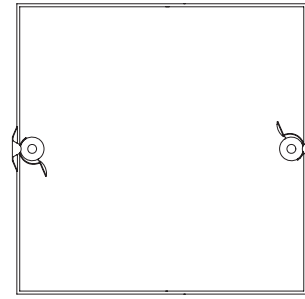
.032" Aluminum with Plated Steel Cams and Strikers
 24-GA Stainless Steel with Stainless Steel Cams and Strikers

NOTES

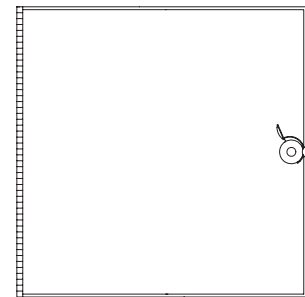
1. "A" width and "B" height are opening dimensions.
2. Standard construction to 4.5" Static Pressure.
3. On non standard doors, the height is always the larger dimension.

DOOR SIZES

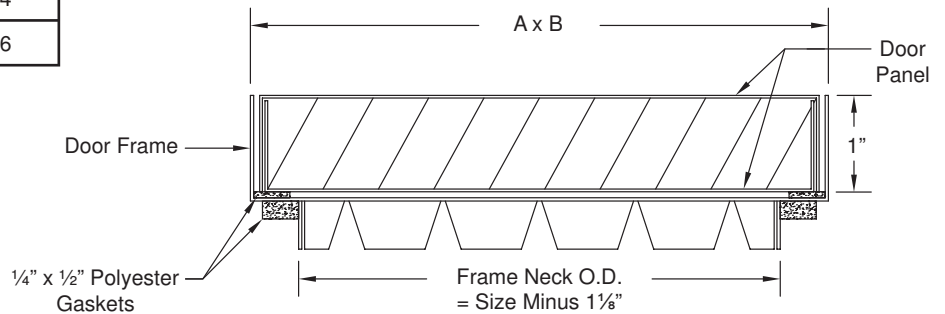
Panels	Standard Sizes	FSA100 Cams	FSA101 Cams
FSA	6"W x 6"H	1	2
	8"W x 8"H	1	2
	10"W x 10"H	1	2
	12"W x 12"H	1	2
	14"W x 14"H	1	2
	16"W x 16"H	2	4
	18"W x 18"H	2	4
	20"W x 20"H	2	4
	24"W x 24"H	2	4
	24"W x 36"H	3	6



FSA101



FSA100



MODEL FSA

1" Deep • Duct Access Door

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MODEL FSAH

1" Deep • High Pressure Duct Access Door

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 22-GA galvanized steel

DOOR PANEL: 24-GA galvanized steel

INSULATION: 1" fiberglass

PRE-FORMED TABS: 22-GA galvanized steel

FINISH: Mill

OPTIONS

.032" Aluminum with Plated Steel Cams and Strikers

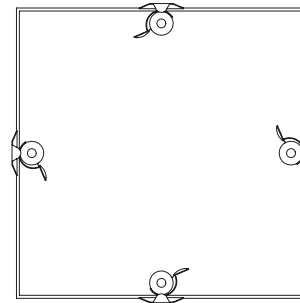
24-GA Stainless Steel with Stainless Steel Cams and Strikers

NOTES

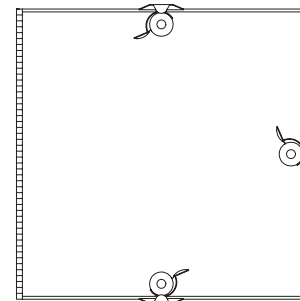
1. "A" width and "B" height are opening dimensions.
2. Standard construction to 10" Static Pressure.
3. On non standard doors, the height is always the larger dimension.

DOOR SIZES

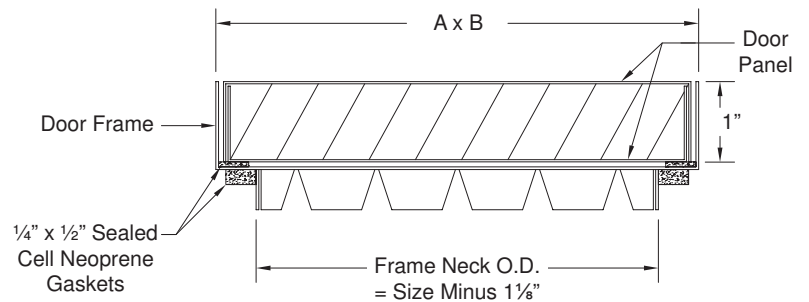
Panels	Standard Sizes	FSA100H Cams	FSA101H Cams
FSA	6"W x 6"H	3	4
	8"W x 8"H	3	4
	10"W x 10"H	3	4
	12"W x 12"H	3	4
	14"W x 14"H	3	4
	16"W x 16"H	6	8
	18"W x 18"H	6	8
	20"W x 20"H	6	8
	24"W x 24"H	6	8



FSA101H



FSA100H



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MODEL FSAH

1" Deep • High Pressure Duct Access Door

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MODEL FSA with VIEWPORT

1" Deep • Plexiglass or Wireglass • Single or Double Panel • Duct Access Door

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 22-GA galvanized steel
DOOR PANEL: 24-GA galvanized steel
INSULATION: 1" fiberglass
FINISH: Mill

OPTIONS

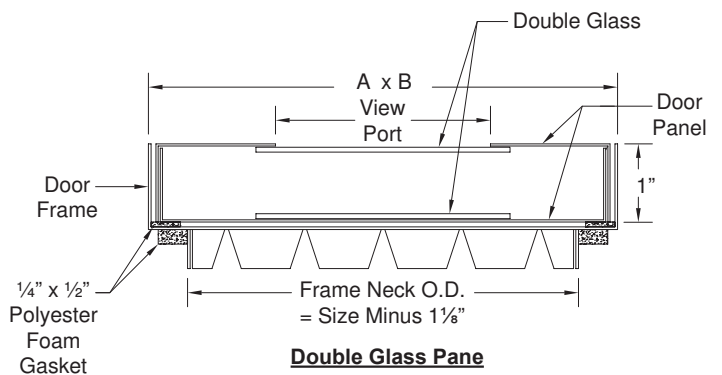
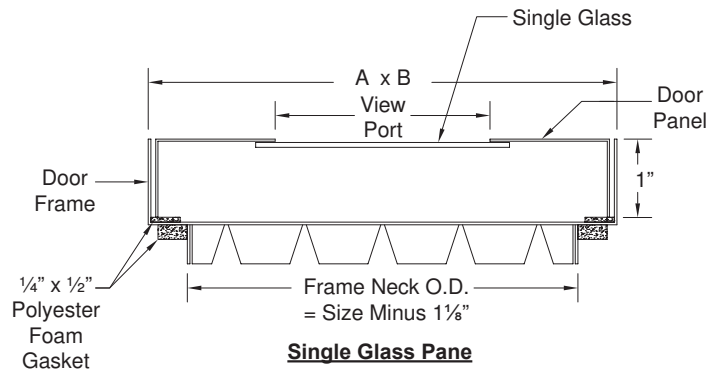
Hinged or Cammed
 Single or Double Pane
 Wireglass
 Plexiglass
 Fiberboard Ductwork
 Flanged
 High Pressure

NOTES

1. "A" width and "B" height are opening dimensions.
2. Double window doors 12" x 12" and larger are insulated with 1" thick rigid fiberglass.
3. Standard Pressure Rating is 4.5 in.wg. High Pressure Rating is 10 in.wg.
4. On non-standard doors, the height is always the larger dimension.

DOOR SIZES

Panels	Standard Sizes	Round Glass Size
FSA	6"W x 6"H	2¾"
	8"W x 8"H	4¾"
	10"W x 10"H	4¾"
	12"W x 12"H	6¾"
	14"W x 14"H	6¾"
	16"W x 16"H	6¾"
	18"W x 18"H	6¾"
	20"W x 20"H	6¾"
	24"W x 24"H	6¾"



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MODEL FSA with Viewport

1" Deep • Plexiglass or Wireglass • Single or Double Panel • Duct Access Door

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MODEL FSA with FLANGE

1" Deep • Flanged Framed • Duct Access Door

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 22-GA galvanized steel
DOOR PANEL: 24-GA galvanized steel
INSULATION: 1" fiberglass
FINISH: Mill

OPTIONS

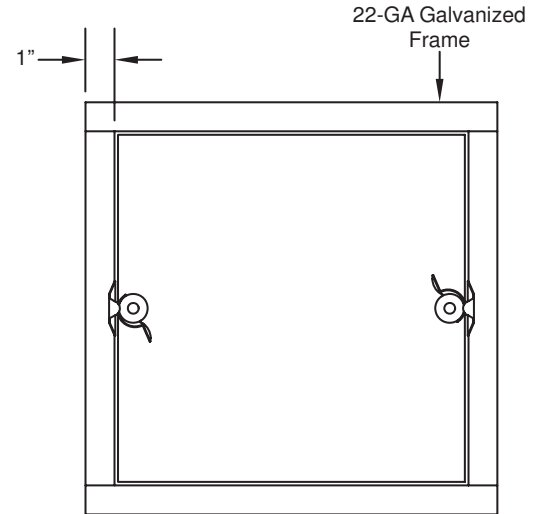
Hinged or Flanged
 Viewports
 High Pressure

NOTES

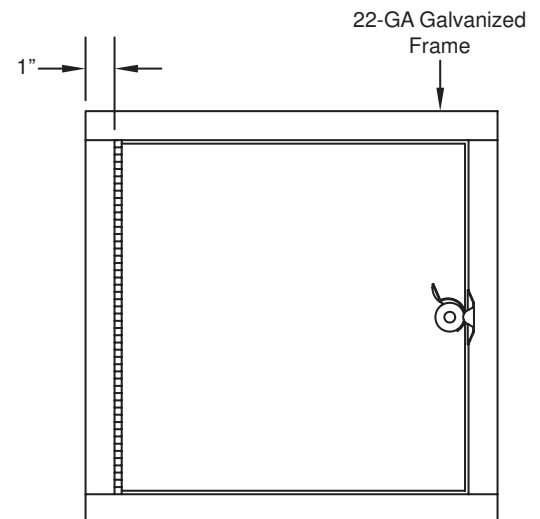
1. "A" width and "B" height are opening dimensions.
2. Duct opening should be $\frac{1}{8}$ " greater than door size.
3. Standard Pressure Rating is 4.5 in.wg. High Pressure Rating is 10 in.wg.
4. On non-standard doors, the height is always the larger dimension.

DOOR SIZES

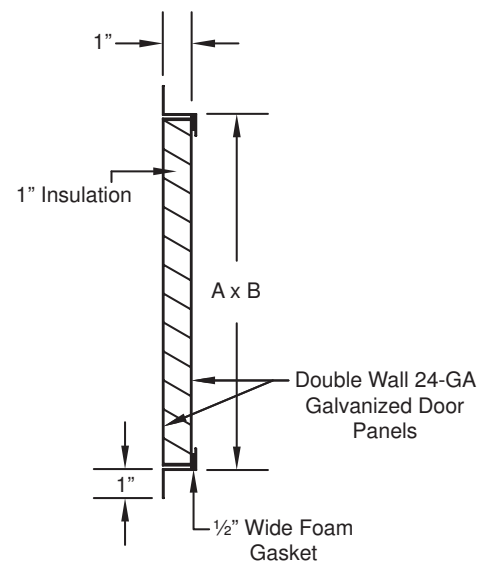
Panels	Standard Sizes	Hinged FSA102 Cams	Hinged High Pressure FSA102_H Cams	Cammed FSA103 Cams	Cammed High Pressure FSA103_H Cams
FSA	6"W x 6"H	1	3	2	4
	8"W x 8"H	1	3	2	4
	10"W x 10"H	1	3	2	4
	12"W x 12"H	1	3	2	4
	14"W x 14"H	1	3	2	4
	16"W x 16"H	2	6	4	8
	18"W x 18"H	2	6	4	8
	20"W x 20"H	2	6	4	8
	24"W x 24"H	2	6	4	8



Cammed



Hinged



MODEL FSA with FLANGE

1" Deep • Flanged Framed • Duct Access Door

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MODEL FSA with FIBERGLASS DUCTWORK

1" Deep • For Fiberglass Duct Work • Duct Access Door

STANDARD MATERIALS AND CONSTRUCTION

FRAME: 22-GA galvanized steel
DOOR PANEL: 24-GA galvanized steel
INSULATION: 1" fiberglass
PRE-FORMED TABS: 30-GA galvanized steel
FINISH: Mill

OPTIONS

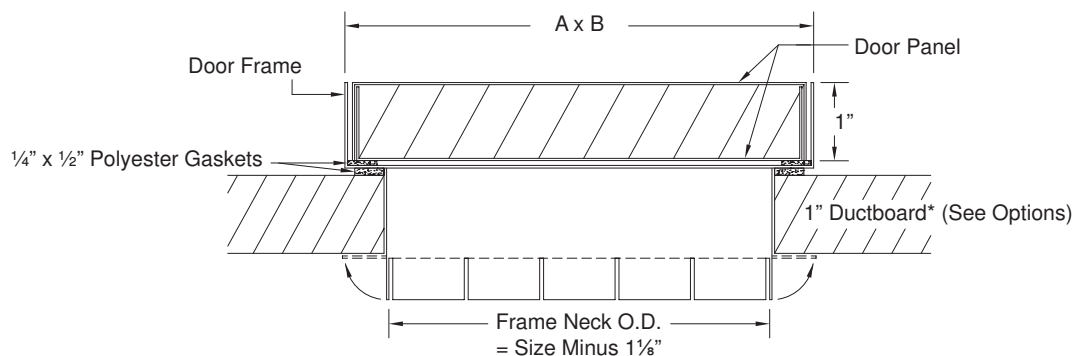
Hinged or Cammed
 *Sleeve for 1½" or 2" ductboard
 Viewports

NOTES

1. "A" width and "B" height are opening dimensions.
2. On non-standard doors, the height is always the larger dimension.

DOOR SIZES

Panels	Standard Sizes	Hinged FSA100_F Cams	Cammed FSA101_F Cams
FSA	6"W x 6"H	1	2
	8"W x 8"H	1	2
	10"W x 10"H	1	2
	12"W x 12"H	1	2
	14"W x 14"H	1	2
	16"W x 16"H	2	4
	18"W x 18"H	2	4
	20"W x 20"H	2	4
	24"W x 24"H	2	4



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MODEL FSA with FIBERGLASS DUCTWORK

1" Deep • For Fiberglass Duct Work • Duct Access Door

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Gravity Ventilators

EAV/IAV — Low Profile, Formed Aluminum

ESV/ISV — Low Profile, Formed Steel

Supplemental Info — Filtered Ventilators

Phone: 859-538-3400 Fax: 859-647-7810

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GRAVITY VENTILATORS

Low Profile - Formed Aluminum

STANDARD CONSTRUCTION

MATERIAL

Hood is of .050" aluminum and throat and curb cap are of .080" thick extruded aluminum alloy 6063-T5. Internal support bracing is 1" x 2" x 1" extruded aluminum channel.

Additional support bracing is added when either hood dimension exceeds 47". Hoods built in sections are of .063" aluminum and include adequate additional support bracing.

ASSEMBLY

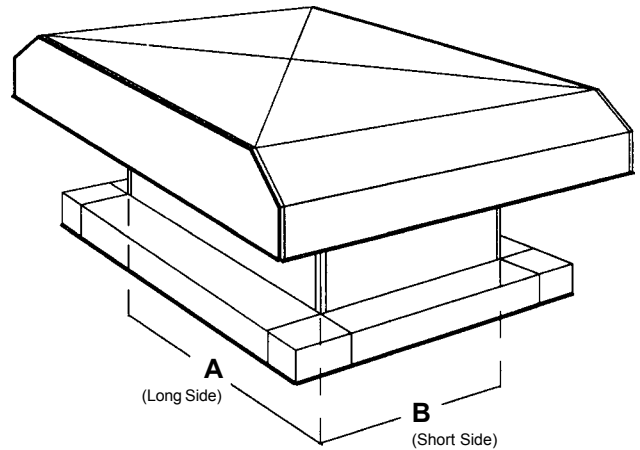
All hoods are mechanically fastened to the throat. Bracing is solid welded throughout. Curb cap joints are solid seal welded to prevent leakage.

SCREEN

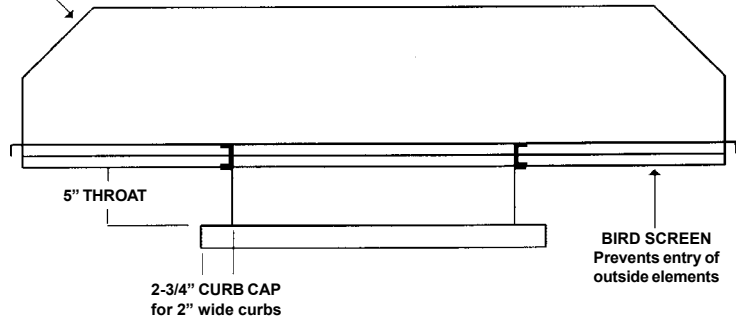
1/2" bird screen mechanically fastened to underside of hood.

FINISH

Mill finish.



CHAMFERED ROOF ENDS
(on short (B) dimension)
Reduces Turbulence,
Decreases Pressure Drop and
Enhances Airflow



FREE AREA AND MODELS

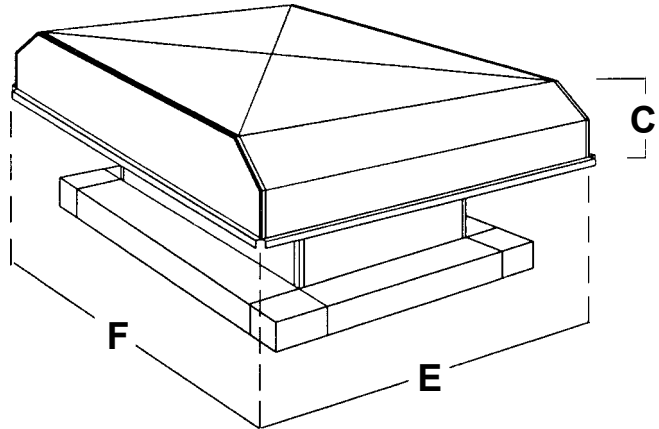
100% (1:1)	200% (2:1)
Exhaust	Intake
EAV	IAV

Qty.	Model	'A'	'B'	Options / Accessories	Tag

PROJECT: _____
 LOCATION: _____
 ARCHITECT: _____
 ENGINEER: _____
 CONTRACTOR: _____
 PO NUMBER: _____
 DATE: _____

HOOD DIMENSIONS

- Find dimensions A x B in selected Free Area sizing chart to determine overall hood height and width.
- Standard throat height is 5" (other heights are available). To determine overall ventilator height add 'C' dimension and throat height (5").
- Standard curb cap is 2-3/4" (other sizes are available).
- Sizes with "*" will ship in multiple sections and require field assembly.



A Dimension (LONG throat width) Square End

		12	14	16	18	20	24	30	36	42	48	54	60	66	72
	C	7	7	7	7	7	7	8	8	8	9	9	9	9	10
12	E	20	20	20	20	20	20	20	20	20	20	20	20	20	20
	F	20	22	25	29	32	38	48	57	67	76	86	95	105	114
	C	7	7	7	7	7	7	8	8	8	9	9	9	9	10
14	E	22	22	22	22	22	22	22	22	22	22	22	22	22	22
	F	22	25	29	32	38	48	57	67	76	86	95	105	115	
	C	7	7	7	7	7	7	8	8	8	9	9	9	9	10
16	E	25	25	25	25	25	25	25	25	25	25	25	25	25	25
	F	26	29	32	38	48	58	67	77	86	96	106	115		
	C	8	8	8	8	9	9	9	10	10	10	10	11		
18	E	28	28	28	28	28	28	28	28	28	28	28	28	28	28
	F	29	32	39	48	58	68	77	87	96	106	116			
	C	8	8	8	8	9	9	9	10	10	10	10	11		
20	E	30	30	30	30	30	30	30	30	30	30	30	30	30	30
	F	30	36	45	54	63	72	81	90	99	108				
	C	11	11	11	12	12	12	13	13	14					
24	E	36	36	36	36	36	36	36	36	36	36	36	36	36	36
	F	36	45	54	63	72	81	90	99	108					
	C	13	13	13	14	14	15	15	16						
30	E	45	45	45	45	45	45	45	45	45	45	45	45	45	45
	F	45	54	63	72	81	90	99	108						
	C	15	15	16	16	17	17	18							
36	E	54	54	54	54	54	54	54	54	54	54	54	54	54	54
	F	54	63	72	81	90	99	108							
	C	15	15	16	16	17	17	18							
42	E	60	60	60	60	60	60	60	60	60	60	60	60	60	60
	F	66	76	85	95	104	113								
	C	17	17	18	19	20									
48	E	72	72	72	72	72	72	72	72	72	72	72	72	72	72
	F	72	81	90	99	108									
	C	21	21	21	21	21	21	21	21	21	21	21	21	21	21
54	E	81	81	81	81	81	81	81	81	81	81	81	81	81	81
	F	81	90	99	108										
	C	21	21	21	21	21	21	21	21	21	21	21	21	21	21
60	E	90	90	90	90	90	90	90	90	90	90	90	90	90	90
	F	90	99	108											
	C	21	21	21	21	21	21	21	21	21	21	21	21	21	21
66	E	93	93	93	93	93	93	93	93	93	93	93	93	93	93
	F	106	115												
	C	21	21	21	21	21	21	21	21	21	21	21	21	21	21
72	E	93	93	93	93	93	93	93	93	93	93	93	93	93	93
	F	126													

B Dimension (SHORT throat width) Chamfered End

A Dimension (LONG throat width) Square End

		12	14	16	18	20	24	30	36	42	48	54	60	66	72
	C	8	8	8	8	9	9	10	10	11	11	12	12	13	13
12	E	23	23	23	23	23	23	23	23	23	23	23	23	23	23
	F	23	27	30	34	38	46	57	69	80	91	103	114	126	137
	C	8	8	8	8	9	9	10	10	11	11	12	12	13	13
14	E	26	26	26	26	26	26	26	26	26	26	26	26	26	26
	F	26	30	34	38	45	57	68	79	90	102	113	124	136	
	C	8	8	8	8	9	9	10	10	11	11	12	12	13	13
16	E	30	30	30	30	30	30	30	30	30	30	30	30	30	30
	F	30	34	37	45	56	67	78	90	101	112	123	134		
	C	8	8	8	8	9	9	10	10	11	11	12	12	13	13
18	E	34	34	34	34	34	34	34	34	34	34	34	34	34	34
	F	33	37	44	56	67	78	89	100	111	122	133			
	C	8	8	8	8	9	9	10	10	11	11	12	12	13	13
20	E	36	36	36	36	36	36	36	36	36	36	36	36	36	36
	F	36	43	54	65	76	87	98	108	119	130				
	C	11	11	12	12	13	14	14	15	16					
24	E	43	43	43	43	43	43	43	43	43	43	43	43	43	43
	F	44	54	65	76	87	98	109	120	131					
	C	14	14	15	16	16	17	18	19						
30	E	54	54	54	54	54	54	54	54	54	54	54	54	54	54
	F	54	65	76	87	98	108	119	130						
	C	17	17	18	19	20	21	22							
36	E	60	60	60	60	60	60	60	60	60	60	60	60	60	60
	F	60	70	82	94	105	117	129	140						
	C	19	19	20	21	22	23	24							
42	E	76	76	76	76	76	76	76	76	76	76	76	76	76	76
	F	75	86	97	108	119	129								
	C	22	22	23	24	25	27								
48	E	87	87	87	87	87	87	87	87	87	87	87	87	87	87
	F	86	97	108	118	129									
	C	27	27	27	27	27	27	27	27	27	27	27	27	27	27
54	E	93	93	93	93	93	93	93	93	93	93	93	93	93	93
	F	102	113	125	136										
	C	27	27	27	27	27	27	27	27	27	27	27	27	27	27
60	E	93	93	93	93	93	93	93	93	93	93	93	93	93	93
	F	126	138	151											
	C	27	27	27	27	27	27	27	27	27	27	27	27	27	27
66	E	93	93	93	93	93	93	93	93	93	93	93	93	93	93
	F	152	152	152	152	152	152	152	152	152	152	152	152	152	152
	C	27	27	27	27	27	27	27	27	27	27	27	27	27	27
72	E	120	120	120	120	120	120	120	120	120	120	120	120	120	120
	F	140	140	140	140	140	140	140	140	140	140	140	140	140	140

B Dimension (SHORT throat width) Chamfered End

STATIC PRESSURE LOSS (in. wg.)

Throat Velocity	100%	200%	
	EXHAUST	INTAKE	EXHAUST
300 FPM	.012"	.018"	.008"
400 FPM	.021"	.031"	.013"
500 FPM	.033"	.049"	.021"
600 FPM	.048"	.071"	.030"
700 FPM	.065"	.096"	.041"
800 FPM	.085"	.126"	.053"
900 FPM	.108"	.159"	.068"
1000 FPM	.133"	.196"	.084"
1100 FPM	.161"	.237"	.101"
1200 FPM	.192"	.282"	.120"

FORMULAS

1. Hood Velocity (fpm)

$$\text{Throat Velocity (FPM)} \div \begin{matrix} 1 \text{ (100\% Free Area)} \\ 2 \text{ (200\% Free Area)} \end{matrix}$$

2. Throat Velocity (fpm)

$$\text{Hood Velocity (FPM)} \div \begin{matrix} 1 \text{ (100\% Free Area)} \\ 2 \text{ (200\% Free Area)} \end{matrix}$$

3. Throat Size (Square Feet)

$$\text{Air Flow (CFM)} \div \text{Throat Velocity (FPM)}$$

4. Throat Perimeter (Inches)

$$A + A + B + B$$

SIZING RECOMMENDATIONS

1. On **INTAKE** Gravity Ventilators, the Hood Velocity should **NOT** exceed 600 fpm.
2. To size a 2" Curb using the standard gravity ventilator curb cap of 2-3/4", add **throat size + 4"** to allow for the curb cap distance from the throat with adequate installation allowance.

OPTIONS / ACCESSORIES

SCREENS

A wide variety of bird or insect screens are available in various gauges and mesh dimensions including a snow screen

MATERIAL

Aluminum thickness in .063" or .081" on hood.

CURB CAP

Standard is 2-3/4" for 2" curbs, although by specifying, curb cap is available in any size.

THROAT OPTIONS

Standard exposed throat height of 5" can be extended to any selected height. Hoods (throat sizes up to 60" x 60") can be hinged to throat for swing open access from one side or split horizontally creating two sections for lift up access.

INSULATION/ANTI CONDENSATE

Mastic coating is available on the underside of the hood, or insulation (1" or 2") can be installed in either the hood or the throat.

HEAVY CONSTRUCTION

For high wind area applications, our high wind loading option assures your gravity ventilator will remain intact under wind conditions up to 125 miles per hour.

DAMPER MOUNT

Dampers can be mounted horizontally in the throat or vertically around the inside perimeter of the hood.

FILTERS AND RACKS

1" or 2" filters and racks, available in disposable or washable (Note: disposable available on specific sizes only.)

FINISHES

A wide selection of finishes are available, including baked enamel, epoxy, and prime coat.

GRAVITY VENTILATORS

Low Profile - Formed Steel

STANDARD CONSTRUCTION

MATERIAL

Hood, throat, and curb cap are of 18 gauge galvanized steel. All internal bracing consists of steel angle 1-1/4" x 1-1/4" x 1/8".

ASSEMBLY

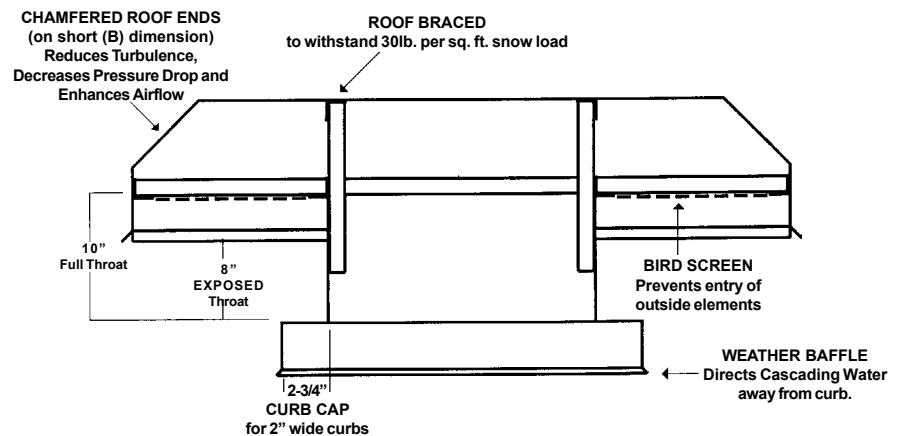
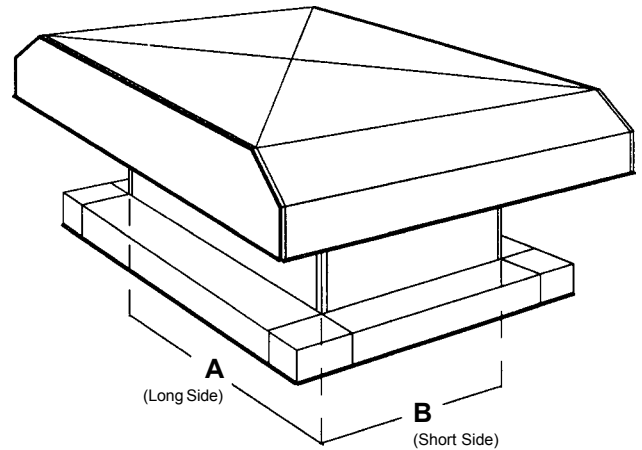
Hood is mechanically fastened to throat for ease in removal. All throat joints are seam welded and caulked. Bracing is solid welded throughout. Curb cap joints are solid seal welded to prevent leakage.

SCREEN

1/2" bird screen mechanically fastened to underside of hood.

FINISH

Mill finish.



FREE AREA AND MODELS

100% (1:1)	200% (2:1)
Exhaust	Intake
ESV	ISV

Qty.	Model	'A'	'B'	Options / Accessories	Tag

PROJECT: _____
 LOCATION: _____
 ARCHITECT: _____
 ENGINEER: _____
 CONTRACTOR: _____
 PO NUMBER: _____
 DATE: _____

STATIC PRESSURE LOSS (in. wg.)

Throat Velocity	100%	200%	
	EXHAUST	INTAKE	EXHAUST
300 FPM	.012"	.018"	.008"
400 FPM	.021"	.031"	.013"
500 FPM	.033"	.049"	.021"
600 FPM	.048"	.071"	.030"
700 FPM	.065"	.096"	.041"
800 FPM	.085"	.126"	.053"
900 FPM	.108"	.159"	.068"
1000 FPM	.133"	.196"	.084"
1100 FPM	.161"	.237"	.101"
1200 FPM	.192"	.282"	.120"

FORMULAS

1. Hood Velocity (fpm)

Throat Velocity (FPM) ÷ 1 (100% Free Area)
 1.5 (150% Free Area)
 2 (200% Free Area)

2. Throat Velocity (fpm)

Hood Velocity (FPM) ÷ 1 (100% Free Area)
 1.5 (150% Free Area)
 2 (200% Free Area)

3. Throat Size (Square Feet)

Air Flow (CFM) ÷ Throat Velocity (FPM)

4. Throat Perimeter (Inches)

A + A + B + B

SIZING RECOMMENDATIONS

1. On **INTAKE** Gravity Ventilators, the Hood Velocity should **NOT** exceed 600 fpm.
2. To size a 2" Curb using the standard gravity ventilator curb cap of 2-3/4", add **throat size + 4"** to allow for the curb cap distance from the throat with adequate installation allowance.

HOOD DIMENSIONS

- Find dimensions A x B in selected Free Area sizing chart to determine overall hood height and width.
- Standard throat height is 8" (other heights are available). To determine overall ventilator height add 'C' dimension and throat height (8").
- Standard curb cap is 2-3/4" (other sizes are available).
- Sizes with black background will ship in multiple sections and require field assembly.

INTAKE

A Dimension (LONG throat width) Square End

		12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
	C	7	7	8	8	8	9	9	9	9	9	9	9	9	9	9
12	E	26	30	40	47	47	60	60	79	87	83	90	96	102	108	114
	F	25	26	29	29	35	30	35	30	30	34	35	35	36	36	36
	C		9	9	10	11	11	11	12	12	12	12	12	12	12	12
18	E		37	45	48	56	66	69	75	82	87	98	104	112	120	125
	F		35	37	42	42	45	45	46	46	45	46	46	46	46	46
	C			11	11	12	13	13	14	14	14	15	15	15	15	15
24	E			46	57	60	65	66	74	82	90	97	105	112	120	128
	F			46	46	51	54	60	60	60	60	60	60	60	60	60
	C				13	14	14	15	16	16	16	17	17	17	17	17
30	E				60	63	73	82	91	101	10	103	108	114	120	126
	F				53	60	60	60	60	60	60	70	72	73	74	75
	C					15	16	16	17	17	18	18	18	19	19	19
36	E					75	77	77	86	94	97	104	110	117	120	130
	F					60	66	76	76	76	81	82	71	85	88	87
	C						17	17	18	18	19	19	20	20	20	21
42	E						84	86	88	93	100	109	113	126	131	137
	F						71	79	86	90	91	91	94	91	94	94
	C							18	19	20	20	21	21	22	22	22
48	E							91	98	104	110	118	130	144	154	163
	F							85	88	91	92	91	94	91	91	91
	C								20	20	21	22	22	23	23	23
54	E								108	117	127	138	150	161	172	182
	F								89	91	91	91	91	91	91	91
	C									21	22	23	23	24	24	24
60	E									130	140	153	166	178	146	154
	F									91	92	91	91	91	118	118
	C										23	23	24	25	25	26
66	E										158	155	176	156	161	172
	F										91	94	94	118	118	118
	C											24	25	26	26	27
72	E											144	153	162	175	187
	F											117	118	118	118	118
	C												26	26	27	28
78	E												166	178	158	168
	F												118	118	142	142
	C													27	28	29
84	E													168	169	171
	F														134	142
	C															29
90	E															181
	F															142
	C															33
96	E															192
	F															152

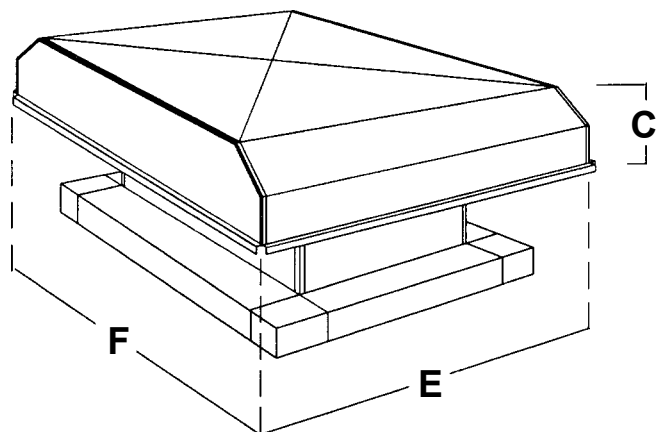
B Dimension (SHORT throat width) Chamfered End

EXHAUST

A Dimension (LONG throat width) Square End

		12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
	C	7	7	8	8	8	9	9	9	9	9	9	9	9	9	9
12	E	25	30	40	45	53	60	60	70	77	83	90	96	102	108	114
	F	19	22	21	22	22	22	24	24	24	24	24	25	25	25	25
	C		9	9	10	11	11	11	12	12	12	12	12	12	12	12
18	E		35	39	48	55	60	71	79	87	85	94	100	106	112	119
	F		27	30	30	32	32	30	30	30	34	33	34	34	34	35
	C			11	11	12	13	13	14	14	14	15	15	15	15	15
24	E			44	50	60	60	72	78	85	91	97	104	110	116	120
	F			34	36	36	41	39	40	40	41	46	42	43	43	44
	C				13	14	14	15	16	16	16	17	17	17	17	17
30	E				48	60	65	74	84	91	94	104	108	114	120	120
	F				46	44	46	46	46	46	48	48	50	50	51	54
	C					15	16	16	17	17	18	18	18	19	19	19
36	E						60	71	77	75	83	90	98	106	113	120
	F						52	51	53	60	60	60	60	60	60	60
	C							17	17	18	19	19	19	20	20	21
42	E								70	78	86	95	104	113	122	133
	F								60	60	60	60	60	60	65	67
	C									18	19	20	20	21	21	22
48	E									88	88	91	102	109	116	120
	F									60	67	72	70	71	72	74
	C										20	20	21	22	22	23
54	E										89	96	104	111	118	120
	F										74	76	76	78	79	83
	C											21	22	22	23	24
60	E											98	106	113	120	126
	F											82	83	84	86	91
	C												23	23	24	25
66	E												103	111	122	129
	F												94	94	92	94
	C													24	25	26
72	E													120	135	140
	F													94	91	91
	C														26	27
78	E														144	154
	F														92	92
	C															27
84	E															127
	F															118
	C															29
90	E															148
	F															118
	C															30
96	E															167
	F															118

B Dimension (SHORT throat width) Chamfered End



abi air balance
A Mestek Company

OPTIONS / ACCESSORIES

SCREENS

A wide variety of bird or insect screens are available in various gauges and mesh dimensions including a snow screen

MATERIAL

Various gauges of galvanized, galvaneal, or stainless steel on throat or hood or both.

CURB CAP

Standard is 2-3/4" for 2" curbs, although by specifying, curb cap is available in any size.

THROAT OPTIONS

Standard exposed throat height of 8" (10" total) can be extended to any selected height. Hoods (throat sizes up to 60" x 60") can be hinged to throat for swing open access from one side or split horizontally creating two sections for lift up access.

INSULATION/ANTI CONDENSATE

Mastic coating is available on the underside of the hood, or insulation (1" or 2") can be installed in either the hood or the throat.

ACCESS PANELS

To provide a passageway to internal equipment, an access panel can be cut into the throat and lined with a protective vinyl edge seal.

HEAVY CONSTRUCTION

For high wind area applications, our high wind loading option assures your gravity ventilator will remain intact under wind conditions up to 125 miles per hour.

DAMPER MOUNT

Dampers can be mounted horizontally in the throat or vertically around the inside perimeter of the hood.

SECURITY BARS

Selections of bar diameters, frame styles, and spacing.

FILTERS AND RACKS

1" or 2" filters and racks, available in disposable or washable (Note: disposable available on specific sizes only.)

FINISHES

A wide selection of finishes are available, including baked enamel, epoxy, and prime coat.

FILTERED VENTILATORS TECHNICAL & SUBMITTAL DATA

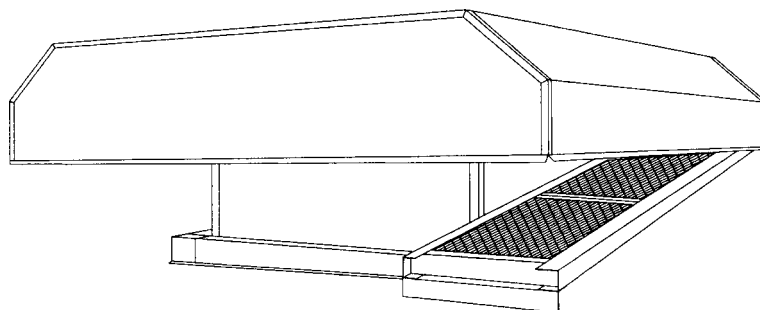
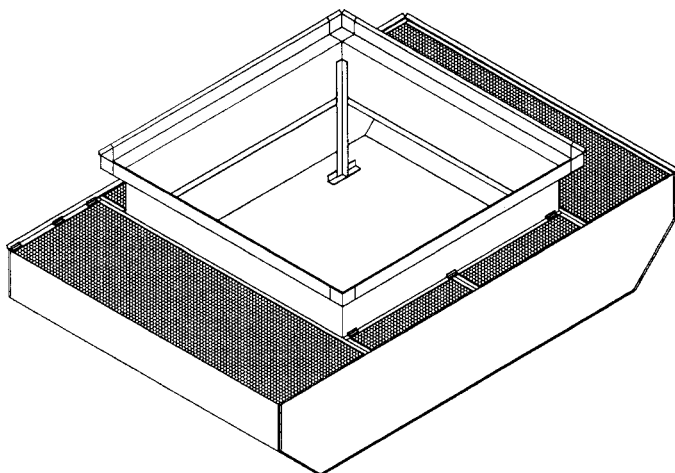
STANDARD CONSTRUCTION

Option available for models IAV and IHS in a free area ratio of 200% (2:1) only.

For material, sizing and ventilator performance information, see selected model submittal. For filter resistance, see reverse side.

ASSEMBLY

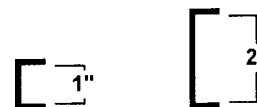
- Hood is mechanically fastened to throat for ease of removal.
- Filter racks are mechanically fastened to the bottom perimeter opening of the hood and hinged with drop down access for ease in filter replacement.
- Standard screen is omitted to eliminate interference with filter performance, but can be specified as an option.



RACK SIZES

1 or 2"

- Racks are available in either 1" or 2" depth to accommodate filters 1" deep or 2" deep accordingly.



FILTER TYPES

DISPOSABLE

- For commercial and industrial applications, this filter is constructed of continuous filament glass fibers, bonded together with a rugged fiberboard and secured with metal grilles on both sides (see reverse side for performance).

WASHABLE

- Applicable for commercial and industrial applications, these long lasting filters maintain their initial efficiency with periodic care. Media is constructed of staggered multi-layered slit aluminum sheets forming thousands of highly effective holding baffles. The all aluminum frame assures extra rigidity and durability.

Qty.	'A'	'B'	Rack Size	Filter Type	Options / Accessories	Tag

FILTER AVERAGE ARRESTANCE

DISPOSABLE

Velocity	1" Deep	2" Deep
300 fpm	72%	82%

WASHABLE

Velocity	1" Deep	2" Deep
520 fpm	59%	68%

FILTER RESISTANCE (inches H₂O)

DISPOSABLE

Velocity	1" Deep	2" Deep
300 fpm	0.040	0.080

**MAXIMUM
RECOMMENDED VELOCITY
300 FPM**

WASHABLE

Velocity	1" Deep	2" Deep
150 fpm	0.015	0.015
200 fpm	0.020	0.026
250 fpm	0.027	0.037
300 fpm	0.035	0.051
350 fpm	0.043	0.070
400 fpm	0.054	0.089
450 fpm	0.065	0.110
520 fpm	0.088	0.140
600 fpm	0.114	0.180
650 fpm	0.130	0.200

**MAXIMUM
RECOMMENDED VELOCITY
650 FPM**



Penthouses

P465M/P655M — 4" or 6" Deep, Straight Blade Blade, Mitered Corner
P465P/P655P — 4" or 6" Deep, Straight Blade, Post Corner
P435P/P635P — 4" or 6" Deep, Drainable Blade, Post Corner

air balance

Dampers  Louvers
UL Life Safety Products

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MODEL P465M/P655M

4" or 6" Deep • Straight Blade • Mitered Extruded Aluminum Penthouse

STANDARD MATERIALS AND CONSTRUCTION

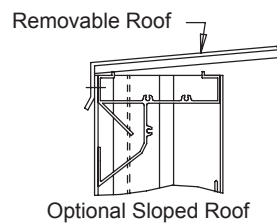
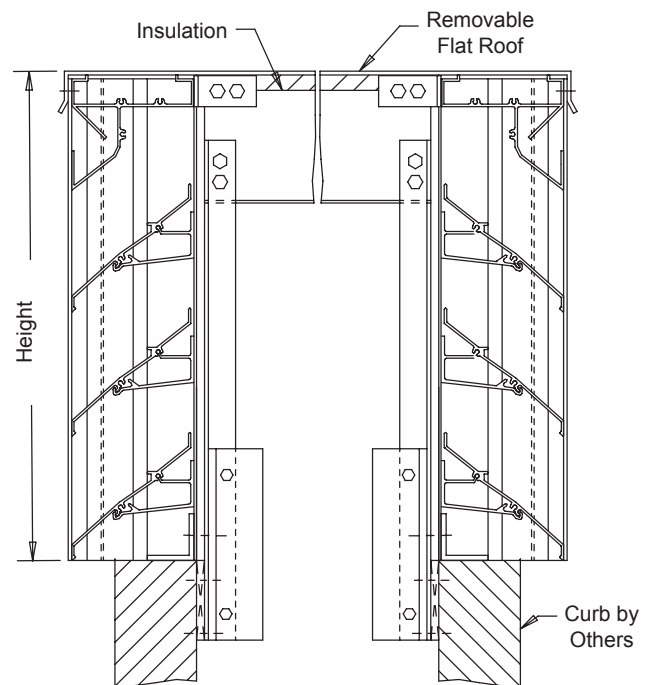
- FRAME:** .081" thick nominal; 6063-T6/T52 extruded aluminum alloy with reinforcing rib bosses
- BLADES:** .081" thick nominal; 6063-T6/T52 extruded aluminum alloy with reinforcing rib bosses
- ROOF:** Removable roof .060" thick sheet aluminum reinforced with aluminum bracing where required to take a snow load of 40 lbs/sq.ft. plus a required safety factor
- INSULATION:** ½" thick insulation on underside of roof
- SCREEN:** ½" x .051" attened galvanized birdscreen
- FINISH:** Mill

OPTIONS

Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 .125" Nominal Construction
 Sloped Roof

NOTES

1. "A" width and "B" height are opening dimensions. Penthouse dimensions "A" or "B" exceeding 84" shall be shipped in section for eld assembly by others.



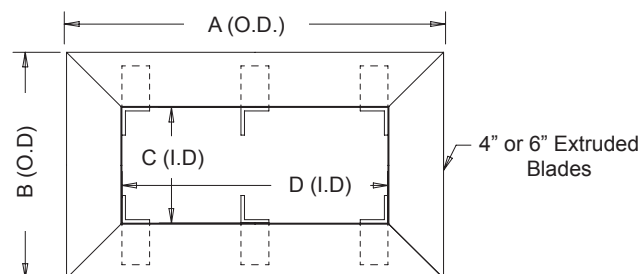
Angles - All Corners and Intermediate, to Extended from Roof into Curb

2" x 2" x ¼" thick Aluminum Angle

Extruded Blade

Mitered Corner Detail

Welded Miter



Continuous Angles at the Four Corners and Intermediate as Required

air balance

Dampers Louvers
 UL Life Safety Products
 Division of Mestek
 Member of AMCA

MODEL P465M/P655M

4" or 6" Deep • Straight Blade • Mitered Extruded Aluminum Penthouse

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MODEL P465P/P655P

4" or 6" Deep • Straight Blade • Post Corner • Extruded Aluminum Penthouse

STANDARD MATERIALS AND CONSTRUCTION

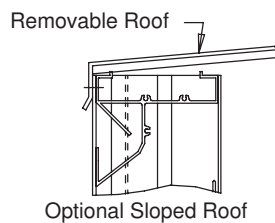
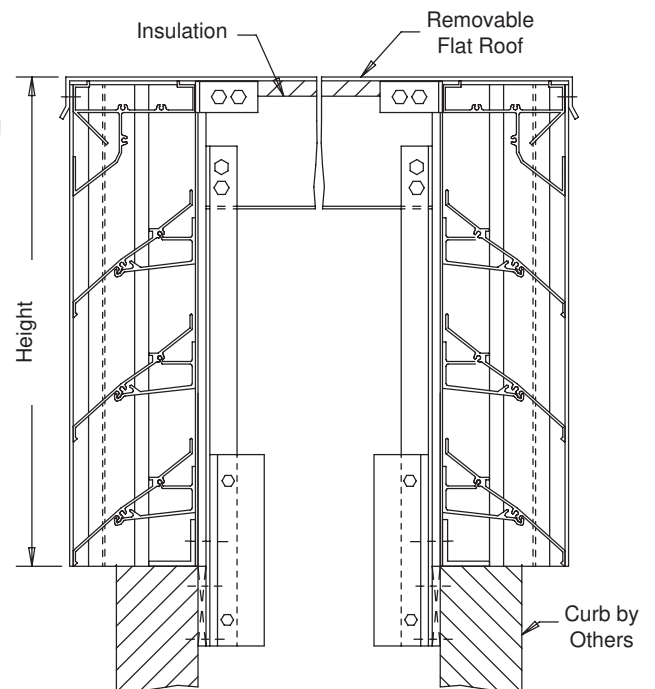
- FRAME:** .081" thick nominal; 6063-T6/T52 extruded aluminum alloy with reinforcing rib bosses
- BLADES:** .081" thick nominal; 6063-T6/T52 extruded aluminum alloy with reinforcing rib bosses
- ROOF:** Removable roof .060" thick sheet aluminum reinforced with aluminum bracing where required to take a snow load of 40 lbs/sq.ft. plus a required safety factor
- INSULATION:** ½" thick insulation on underside of roof
- SCREEN:** ½" x .051" flattened galvanized birdscreen
- FINISH:** Mill

OPTIONS

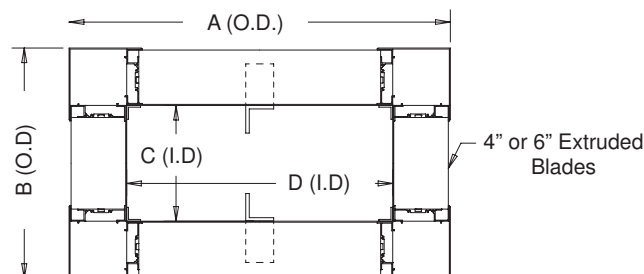
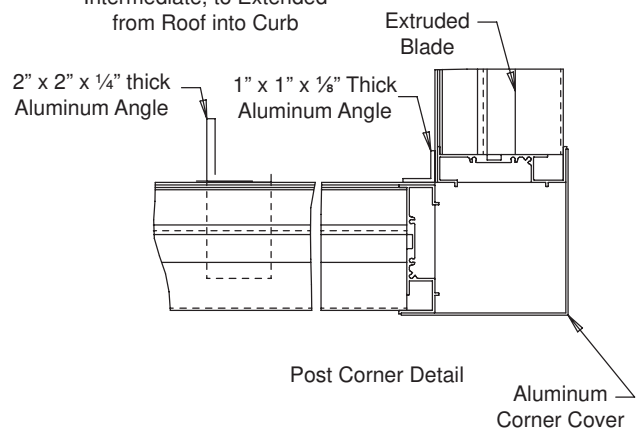
Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 .125" Nominal Construction
 Sloped Roof

NOTES

1. "A" width and "B" height are opening dimensions. Penthouse dimensions "A" or "B" exceeding 84" shall be shipped in section for field assembly by others.



Angles - All Corners and Intermediate, to Extended from Roof into Curb



Continuous Angles at the Four Corners and Intermediate as Required

air balance

Dampers  Louvers
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MODEL P465P/P655P

4" or 6" Deep • Straight Blade • Post Corner • Extruded Aluminum Penthouse

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MODEL P435P/P635P

4" or 6" Deep • Drainable Blade • Post Extruded Aluminum Penthouse

STANDARD MATERIALS AND CONSTRUCTION

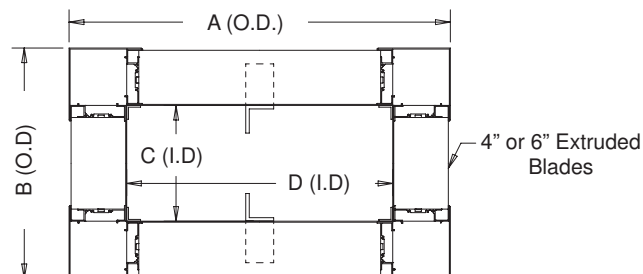
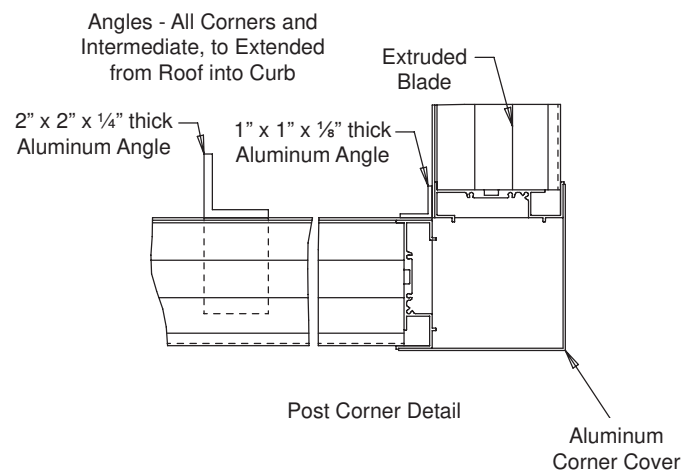
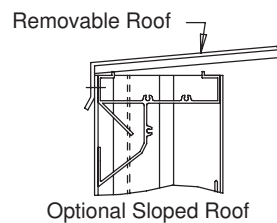
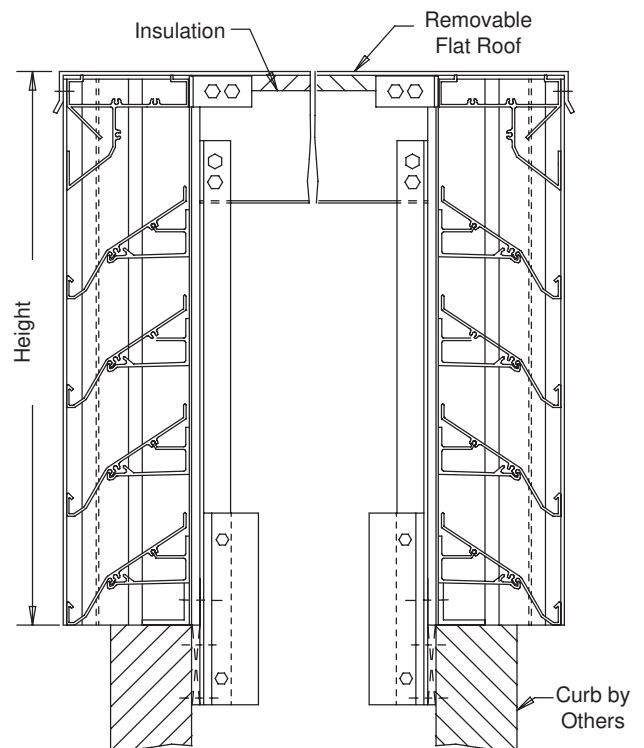
- FRAME:** .081" thick nominal; 6063-T6/T52 extruded aluminum alloy with reinforcing rib bosses
- BLADES:** .081" thick nominal; 6063-T6/T52 extruded aluminum alloy with reinforcing rib bosses
- ROOF:** Removable roof .060" thick sheet aluminum reinforced with aluminum bracing where required to take a snow load of 40 lbs/sq.ft. plus a required safety factor
- INSULATION:** ½" thick insulation on underside of roof
- SCREEN:** ½" x .051" flattened galvanized birdscreen
- FINISH:** Mill

OPTIONS

Finish - Baked Enamel, Kynar, or Anodize
 Variety of Bird and Insect Screen
 .125" Nominal Construction
 Sloped Roof

NOTES

1. "A" width and "B" height are opening dimensions. Penthouse dimensions "A" or "B" exceeding 84" shall be shipped in section for field assembly by others.



Mullions Required Every 8' Max. to Handle
 Water Collected for Blades

air balance

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MODEL P435P/P635P

4" or 6" Deep • Drainable Blade • Post Extruded Aluminum Penthouse

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Rooftop Products

CC — Aluminum/Steel Standard Cant
CL — Aluminum/Steel Raised Cant
CS — Aluminum/Steel Self Flashing
CM — Insulated Formed Aluminum/Steel, Metal Building
CE — Aluminum/Steel Curb Extension Only
CD — Aluminum/Steel Curb Adaptor Only
CX — Aluminum/Steel Curb Adaptor/Extension
HA — Aluminum/Steel Hinged Adapter
EC — Aluminum/Steel Standard Cant Equipment Support
ER — Aluminum/Steel Raised Cant Equipment Support
EF — Aluminum/Steel Self-Flashing Equipment Support

Supplemental Info — Pitched/Peaked Curbs
Supplemental Info — Curb Damper Racks
Supplemental Info — Louvered Curbs

air balance

Dampers  Louvers
UL Life Safety Products

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MODEL CC

Standard Cant • Insulated • Aluminum or Steel Curb

STANDARD MATERIALS AND CONSTRUCTION

Formed Aluminum Curb

SHELL & .063" thick aluminum alloy 3003-H14; All seams

BASE PLATE: are fully welded and sprayed with protective coating

INSULATION: 1" semi-rigid fiberglass

CANT: Mitered 3" x 3" integral cant

NAILER: Nominal 2" x 2" wood nailer for equipment mounting is mechanically fastened to upper curb perimeter

FINISH: Mill

Formed Steel Curb

SHELL & 18-GA galvanized steel; All seams are fully

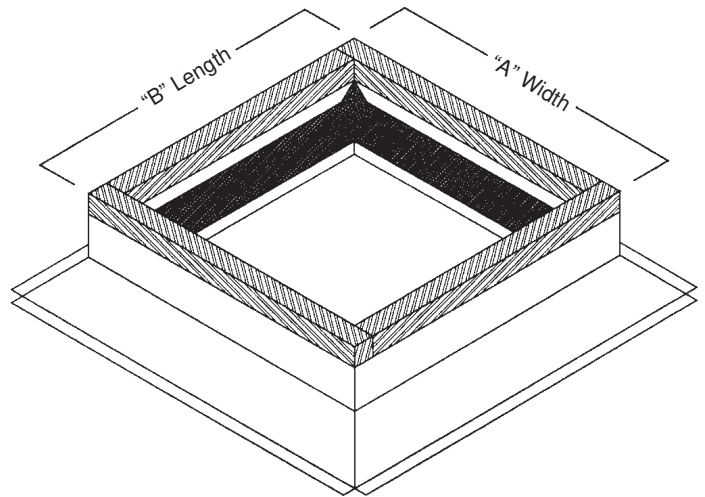
BASE PLATE: welded and sprayed with protective coating

INSULATION: 1" semi-rigid fiberglass

CANT: Mitered 3" x 3" integral cant

NAILER: Nominal 2" x 2" wood nailer for equipment mounting is mechanically fastened to upper curb perimeter

FINISH: Mill



OPTIONS

Material Aluminum - Available in .081-.125 thick 3003-H14 alloy

Material Steel - Available in various gauges of galvanized, galvaneal or stainless

Pitched or Peaked - In conjunction with the overall dimensions, both the height rise, specified in linear inches per foot (ex: 3" in 12") and the direction of the pitch must be specified.

Liners - Used for retention of insulation or as support to strengthen large units that will support a heavy load. Liners are manufactured as an integral part of the product to add maximum structural support.

Platform Cap - A 3/4" plywood top with a metal cap fabricated of the same material as the product.

Gasket - 1/4" thick polyurethane foam gasket can be installed, lining the entire top perimeter. Gasket can be used in place of, or in addition to a wood nailer.

Insulation - Available with 2" semi-rigid insulation.

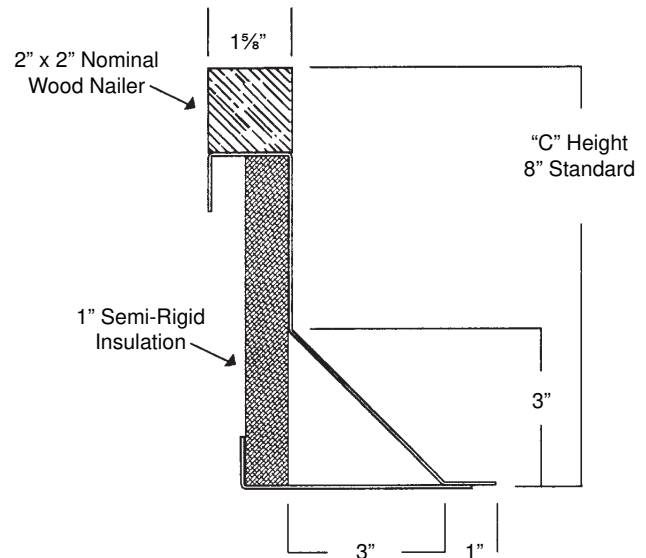
Access Panels - To provide a passageway to internal equipment, an access opening is cut and lined with a protective vinyl edge seal and the cover panel is mechanically fastened over the opening. Minimum height restrictions apply.

Louvered Vents - Provides airflow through the curb. Units are available with 6"W x 7/8"H louvered vents, with 4 per side. Minimum height restrictions apply.

Damper Rack - The rack is located in the bottom of the curb and a damper is then mounted on top of the rack. Damper and/or rack flange dimensions must be specified.

Security Bars - Selections of bar diameters, frame styles, and spacing are available.

Finishes - A wide selection of finishes include baked enamel, epoxy, or prime coat. Aluminum curb finishes include Kynar, clear or color anodize.



NOTES

1. "A" width, "B" length and "C" height are opening dimensions.
2. If either dimension exceeds 90", multi-section construction may be required.

air balance

Dampers  Louvers
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MODEL CC

Standard Cant • Insulated • Aluminum or Steel Curb

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MODEL CL

Raised Cant • Insulated • Aluminum or Steel Curb

STANDARD MATERIALS AND CONSTRUCTION

Formed Aluminum Curb

SHELL & .063" thick aluminum alloy 3003-H14; All seams

BASE PLATE: are fully welded and sprayed with protective coating

INSULATION: 1" semi-rigid fiberglass

CANT: Mitered 3" x 3" integral cant raised 1½"

NAILER: Nominal 2" x 2" wood nailer for equipment mounting is mechanically fastened to upper curb perimeter

FINISH: Mill

Formed Steel Curb

SHELL & 18-GA galvanized steel; All seams are fully

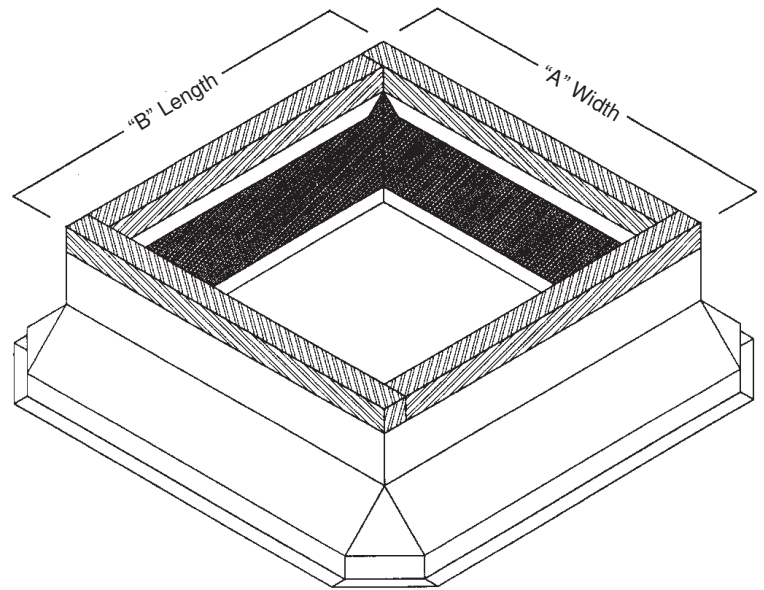
BASE PLATE: welded and sprayed with protective coating

INSULATION: 1" semi-rigid fiberglass

CANT: Mitered 3" x 3" integral cant raised 1½"

NAILER: Nominal 2" x 2" wood nailer for equipment mounting is mechanically fastened to upper curb perimeter

FINISH: Mill



OPTIONS

Material Aluminum - Available in .081-.125 thick 3003-H14 alloy

Material Steel - Available in various gauges of galvanized, galvaneal or stainless

Pitched or Peaked - In conjunction with the overall dimensions, both the height rise, specified in linear inches per foot (ex: 3" in 12") and the direction of the pitch must be specified.

Liners - Used for retention of insulation or as support to strengthen large units that will support a heavy load. Liners are manufactured as an integral part of the product to add maximum structural support.

Platform Cap - A ¾" plywood top with a metal cap fabricated of the same material as the product.

Gasket - ¼" thick polyurethane foam gasket can be installed, lining the entire top perimeter. Gasket can be used in place of, or in addition to a wood nailer.

Insulation - Available with 2" semi-rigid insulation.

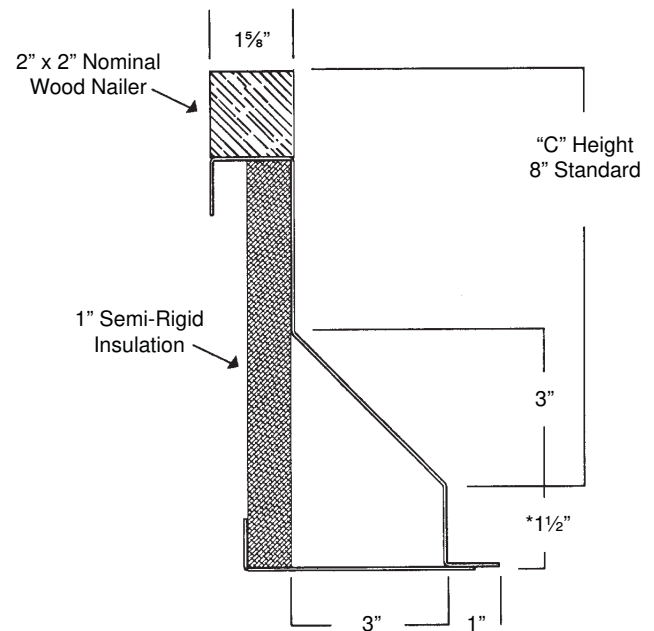
Access Panels - To provide a passageway to internal equipment, an access opening is cut and lined with a protective vinyl edge seal and the cover panel is mechanically fastened over the opening. Minimum height restrictions apply.

Louvered Vents - Provides airflow through the curb. Units are available with 6"W x ⅞"H louvered vents, with 4 per side. Minimum height restrictions apply.

Damper Rack - The rack is located in the bottom of the curb and a damper is then mounted on top of the rack. Damper and/or rack flange dimensions must be specified.

Security Bars - Selections of bar diameters, frame styles, and spacing are available.

Finishes - A wide selection of finishes include baked enamel, epoxy, or prime coat. Aluminum curb finishes include Kynar, clear or color anodize.



*Standard raised cant height may be increased or decreased by specifying.

NOTES

1. "A" width, "B" length and "C" height are outside dimensions.
2. If either dimension exceeds 90", multi-section construction may be required.

air balance

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MODEL CL

Raised Cant • Insulated • Aluminum or Steel Curb

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MODEL CS

Self-Flashing • Insulated • Aluminum or Steel Curb

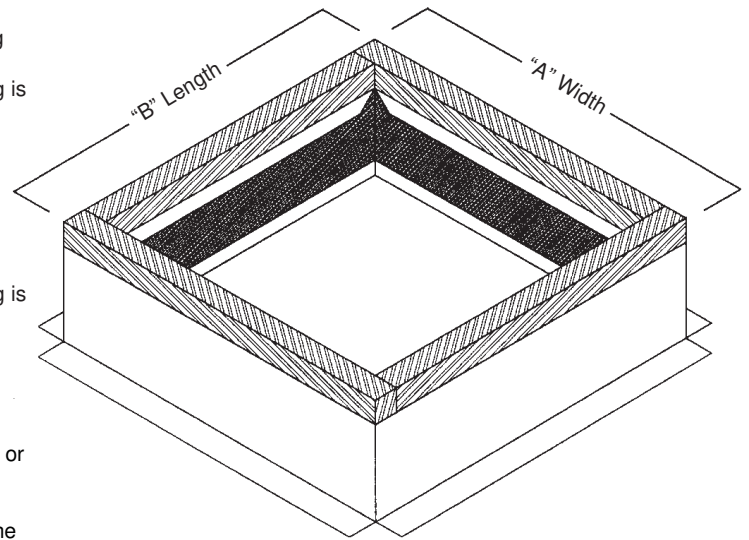
STANDARD MATERIALS AND CONSTRUCTION

Formed Aluminum Curb

SHELL & .063" thick aluminum alloy 3003-H14; All seams
BASE PLATE: are fully welded and sprayed with protective coating
INSULATION: 1" semi-rigid fiberglass
NAILER: Nominal 2" x 2" wood nailer for equipment mounting is
 mechanically fastened to upper curb perimeter
FINISH: Mill

Formed Steel Curb

SHELL & 18-GA galvanized steel; All seams are fully
BASE PLATE: welded and sprayed with protective coating
INSULATION: 1" semi-rigid fiberglass
NAILER: Nominal 2" x 2" wood nailer for equipment mounting is
 mechanically fastened to upper curb perimeter
FINISH: Mill



OPTIONS

Material Aluminum - Available in .081-.125 thick 3003-H14 alloy.

Material Steel - Available in various gauges of galvanized, galvaneal or stainless.

Pitched or Peaked - In conjunction with the overall dimensions, both the height rise, specified in linear inches per foot (ex: 3" in 12") and the direction of the pitch must be specified.

Liners - Used for retention of insulation or as support to strengthen large units that will support a heavy load. Liners are manufactured as an integral part of the product to add maximum structural support.

Corners - Solid welded corners may be added to the self flashing flange on the bottom of the curb.

Platform Cap - A 3/4" plywood top with a metal cap fabricated of the same material as the product.

Gasket - 1/4" thick polyurethane foam gasket can be installed, lining the entire top perimeter. Gasket can be used in place of, or in addition to a wood nailer.

Insulation - Available with 2" semi-rigid insulation.

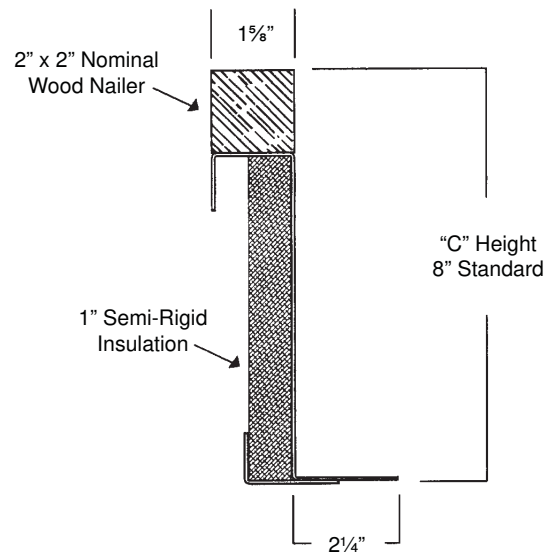
Access Panels - To provide a passageway to internal equipment, an access opening is cut and lined with a protective vinyl edge seal and the cover panel is mechanically fastened over the opening. Minimum height restrictions apply.

Louvered Vents - Provides airflow through the curb. Units are available with 6"W x 7/8"H louvered vents, with 4 per side. Minimum height restrictions apply.

Damper Rack - The rack is located in the bottom of the curb and a damper is then mounted on top of the rack. Damper and/or rack flange dimensions must be specified.

Security Bars - Selections of bar diameters, frame styles, and spacing are available.

Finishes - A wide selection of finishes include baked enamel, epoxy, or prime coat. Aluminum curb finishes include Kynar, clear or color anodize.



NOTES

1. "A" width, "B" length and "C" height are outside dimensions.
2. If either dimension exceeds 90", multi-section construction may be required.
3. Standard curb has no corners.

air balance

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MODEL CS

Self-Flashing • Insulated • Aluminum or Steel Curb

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MODEL CM

Metal Building • Insulated • Aluminum or Steel Curb

STANDARD MATERIALS AND CONSTRUCTION

Formed Aluminum Curb

SHELL & .063" thick aluminum alloy 3003-H14; All seams

BASE PLATE: are fully welded and sprayed with protective coating

INSULATION: 1" semi-rigid fiberglass

NAILER: Nominal 2" x 2" wood nailer

FINISH: Mill

Formed Steel Curb

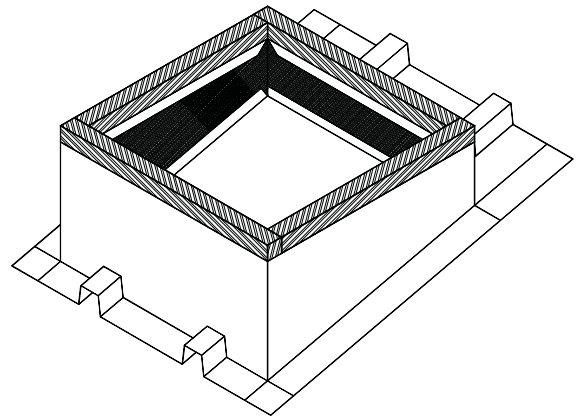
SHELL & 18-GA galvanized steel; All seams are fully

BASE PLATE: welded and sprayed with protective coating

INSULATION: 1" semi-rigid fiberglass

NAILER: Nominal 2" x 2" wood nailer

FINISH: Mill



OPTIONS

Material Aluminum - Available in .081-.125 thick 3003-H14 alloy

Material Steel - Available in various gauges of galvanized, galvaneal or stainless

Pitched or Peaked - In conjunction with the overall dimensions, both the height rise, specified in linear inches per foot (ex: 3" in 12") and the direction of the pitch must be specified.

Liners - Used for retention of insulation or as support to strengthen large units that will support a heavy load. Liners are manufactured as an integral part of the product to add maximum structural support.

Platform Cap - A 3/4" plywood top with a metal cap fabricated of the same material as the product.

Gasket - 1/4" thick polyurethane foam gasket can be installed, lining the entire top perimeter. Gasket can be used in place of, or in addition to a wood nailer.

Insulation - Available with 2" semi-rigid insulation.

Access Panels - To provide a passageway to internal equipment, an access opening is cut and lined with a protective vinyl edge seal and the cover panel is mechanically fastened over the opening. Minimum height restrictions apply.

Louvered Vents - Provides airflow through the curb. Units are available with 6"W x 7/8"H louvered vents, with 4 per side. Minimum height restrictions apply.

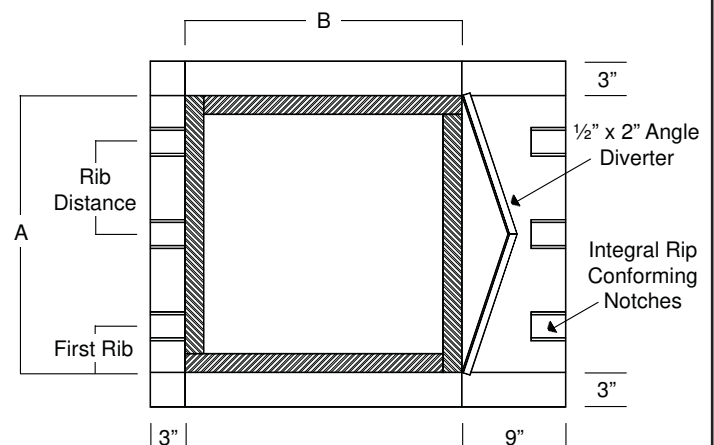
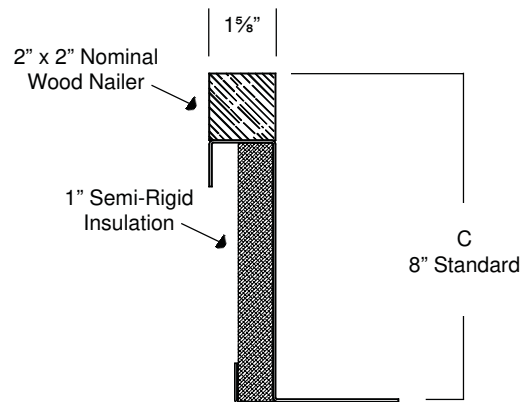
Damper Rack - The rack is located in the bottom of the curb and a damper is then mounted on top of the rack. Damper and/or rack flange dimensions must be specified.

Security Bars - Selections of bar diameters, frame styles, and spacing are available.

Finishes - A wide selection of finishes include baked enamel, epoxy, or prime coat. Aluminum curb finishes include Kynar, clear or color anodize.

NOTES

1. "A" width, "B" length and "C" height are opening dimensions.
2. If either dimension exceeds 90", multi-section construction may be required.
3. Rib detail must be submitted with either manufacturers drawing or roof sample.



air balance

Dampers  Louvers
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MODEL CM

Metal Building • Insulated • Aluminum or Steel Curb

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MODEL CE

Roof Curb Extension • Aluminum or Steel Curb

STANDARD MATERIALS AND CONSTRUCTION

Formed Aluminum Curb

FRAME: .063" thick aluminum alloy 3003-H14; All seams are fully welded and sprayed with protective coating

FINISH: Mill

Formed Steel Curb

FRAME: 18-GA galvanized steel; All seams are fully welded and sprayed with protective coating

FINISH: Mill

OPTIONS

Material Aluminum - Available in .081-.125 thick 3003-H14 alloy

Material Steel - Available in various gauges of galvanized, galvaneal or stainless

Platform Cap - A $\frac{3}{4}$ " plywood top with a metal cap fabricated of the same material as the product.

Wood Nailer - Factory installed wood nailer for equipment mounting is mechanically fastened to top perimeter.

Gasket - $\frac{1}{4}$ " thick polyurethane foam gasket can be installed, lining the entire top perimeter.

Insulation - Available with 1" or 2" semi-rigid insulation.

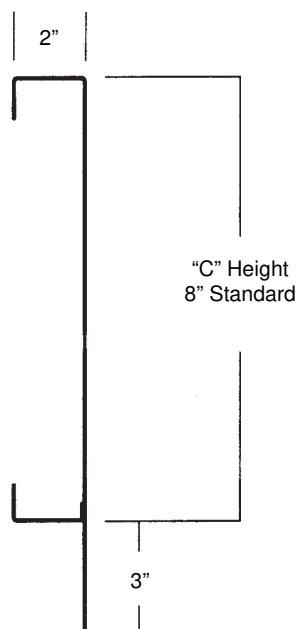
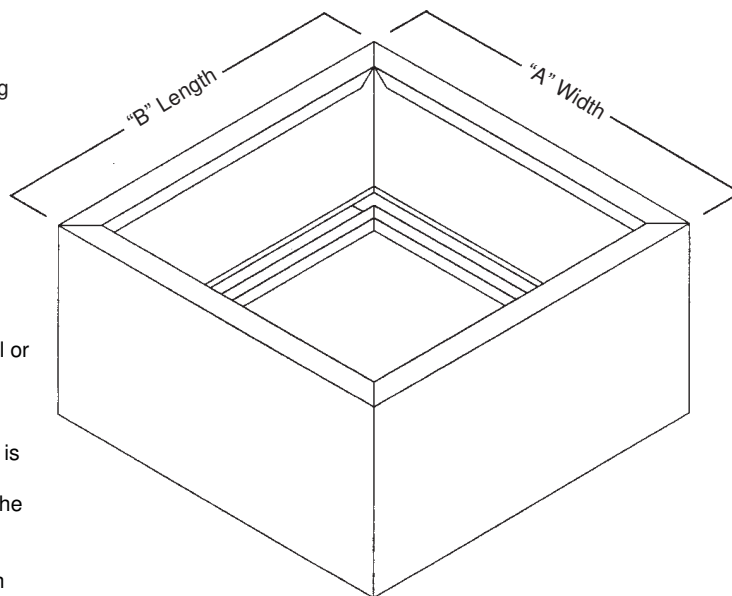
Access Panels - To provide a passageway to internal equipment, an access opening is cut and lined with a protective vinyl edge seal and the cover panel is mechanically fastened over the opening. Minimum height restrictions apply.

Louvered Vents - Provides airflow through the curb. Units are available with 6"W x $\frac{7}{8}$ "H louvered vents, with 4 per side. Minimum height restrictions apply.

Finishes - A wide selection of finishes include baked enamel, epoxy, or prime coat. Aluminum curb finishes include Kynar, clear or color anodize.

NOTES

1. "A" width, "B" length and "C" height are outside dimensions.
2. If either dimension exceeds 90", multi-section construction may be required.



air balance

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MODEL CE

Roof Curb Extension • Aluminum or Steel Curb

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MODEL CD

Roof Curb Adapter • Aluminum or Steel

STANDARD MATERIALS AND CONSTRUCTION

Formed Aluminum Curb

FRAME: .063" thick aluminum alloy 3003-H14; All seams are fully welded and sprayed with protective coating

FINISH: Mill

Formed Steel Curb

FRAME: 18-GA galvanized steel; All seams are fully welded and sprayed with protective coating

FINISH: Mill

OPTIONS

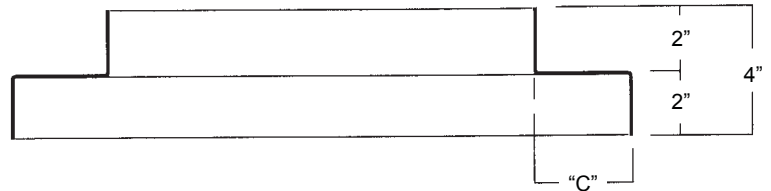
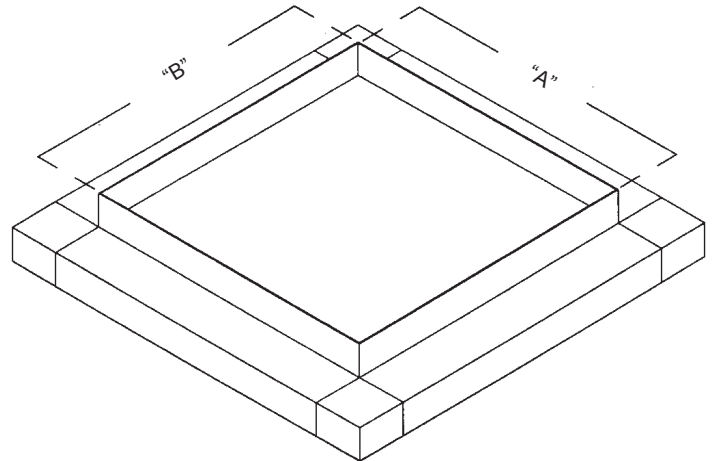
Material Aluminum - Available in .081-.125 thick 3003-H14 alloy

Material Steel - Available in various gauges of galvanized, galvaneal or stainless

Finishes - A wide selection of finishes include baked enamel, epoxy, or prime coat. Aluminum curb finishes include Kynar, clear or color anodize.

NOTES

1. "A", "B" and "C" are outside dimensions.
2. If either dimension exceeds 90", multi-section construction may be required.



air balance

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MODEL CD

Roof Curb Adapter • Aluminum or Steel

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MODEL CX

Adapter/Extension • Aluminum or Steel Curb

STANDARD MATERIALS AND CONSTRUCTION

Formed Aluminum Curb

SHELL & .063" thick aluminum alloy 3003-H14; All seams

BASE PLATE: are fully welded and sprayed with protective coating

FINISH: Mill

Formed Steel Curb

SHELL & 18-GA galvanized steel; All seams are fully

BASE PLATE: welded and sprayed with protective coating

FINISH: Mill

OPTIONS

Material Aluminum - Available in .081-.125 thick 3003-H14 alloy.

Material Steel - Available in various gauges of galvanized, galvanneal or stainless.

Liners - Used for retention of insulation or as support to strengthen large units that will support a heavy load. Liners are manufactured as an integral part of the product to add maximum structural support.

Curb Cap - can be replaced by 4½" or other sizes by specifying.

Platform Cap - A ¾" plywood top with a metal cap fabricated of the same material as the product.

Wood Nailer - Factory installed wood nailer for equipment mounting is mechanically fastened to top perimeter.

Gasket - ¼" thick polyurethane foam gasket can be installed, lining the entire top perimeter. Gasket can be used in place of, or in addition to a wood nailer.

Insulation - Available with 1" or 2" semi-rigid insulation.

Access Panels - To provide a passageway to internal equipment, an access opening is cut and lined with a protective vinyl edge seal and the cover panel is mechanically fastened over the opening. Minimum height restrictions apply.

Louvered Vents - Provides airflow through the curb. Units are available with 6"W x 7/8"H louvered vents, with 4 per side. Minimum height restrictions apply.

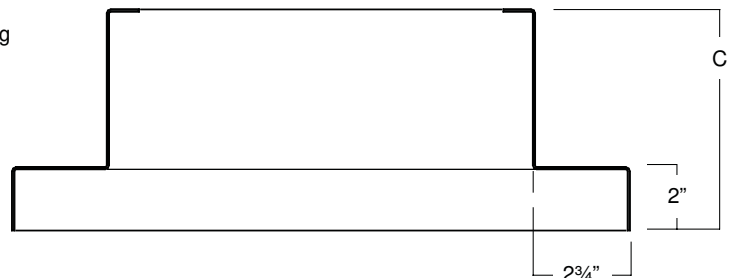
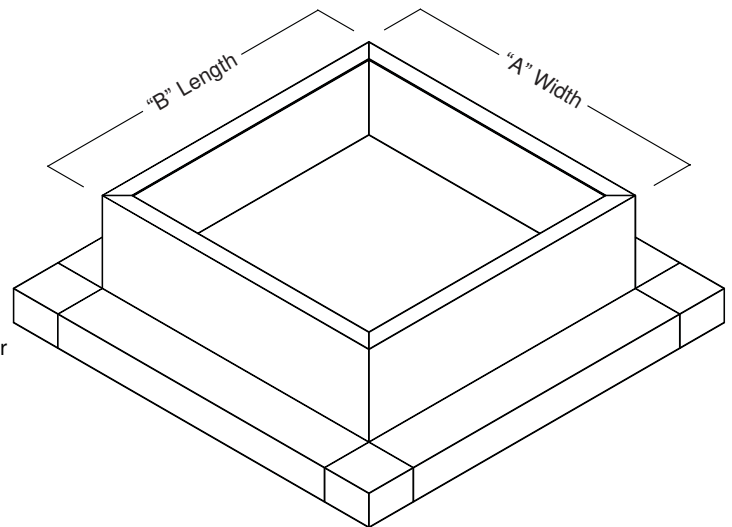
Damper Rack - The rack is located in the bottom of the curb and a damper is then mounted on top of the rack. Damper and/or rack flange dimensions must be specified.

Security Bars - Selections of bar diameters, frame styles, and spacing are available.

Finishes - A wide selection of finishes include baked enamel, epoxy, or prime coat. Aluminum curb finishes include Kynar, clear or color anodize.

NOTES

1. "A" width, "B" length and "C" height are outside dimensions.
2. If either dimension exceeds 90", multi-section construction may be required.



air balance

Dampers  Louvers
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MODEL CX

Adapter/Extension • Aluminum or Steel Curb

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MODEL HA

Hinged Adapter • Aluminum or Steel Curb

STANDARD MATERIALS AND CONSTRUCTION

Formed Aluminum Curb

SHELL & .063" thick aluminum alloy 3003-H14; All seams

BASE PLATE: are fully welded and sprayed with protective coating

HINGES: Heavy duty butt hinges and 2 piece padlock hasp

GASKET: Urethane gasket around perimeter for sealing and water tightness

FINISH: Mill

Formed Steel Curb

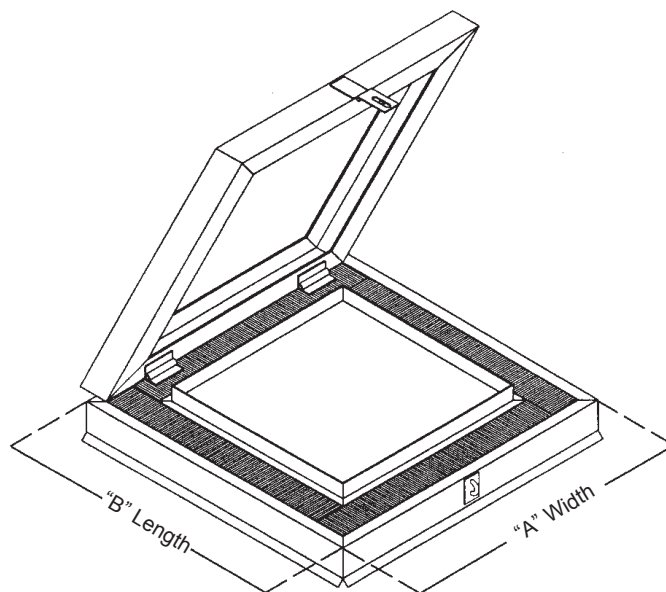
SHELL & 18-GA galvanized steel; All seams are fully

BASE PLATE: welded and sprayed with protective coating

HINGES: Heavy duty butt hinges and 2 piece padlock hasp

GASKET: Urethane gasket around perimeter for sealing and water tightness

FINISH: Mill



OPTIONS

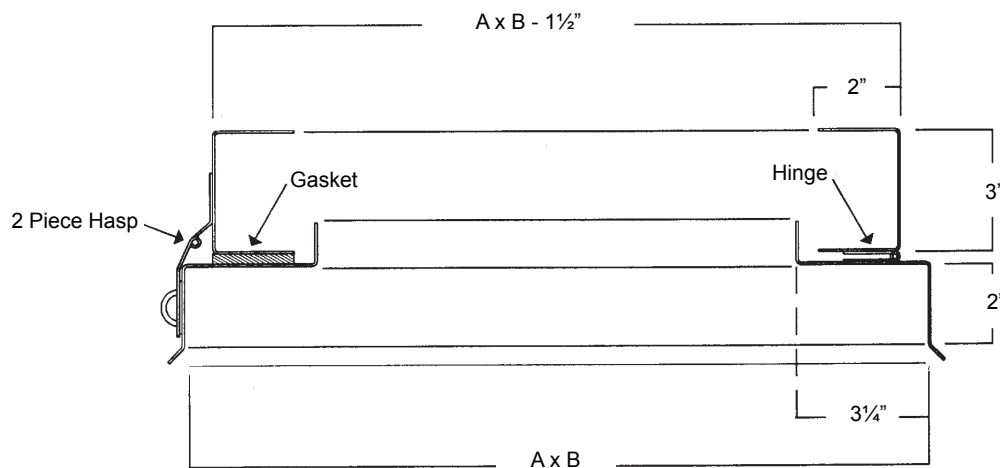
Material Aluminum - Available in .081-.125 thick 3003-H14 alloy.

Material Steel - Available in various gauges of galvanized, galvaneal or stainless.

Finishes - A wide selection of finishes include baked enamel, epoxy, or prime coat. Aluminum curb finishes include Kynar, clear or color anodize.

NOTES

1. "A" width, "B" length are outside dimensions.
2. Maximum size is 60"W x 60"H.



air balance

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MODEL HA

Hinged Adapter • Aluminum or Steel Curb

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MODEL EC

Standard Cant Equipment Support • Aluminum or Steel

STANDARD MATERIALS AND CONSTRUCTION

Formed Aluminum Curb

SHELL & .063" thick aluminum alloy 3003-H14; All seams

BASE PLATE: are fully welded and sprayed with protective coating

CANT: Mitered 3" x 3" integral cant

REINFORCEMENTS: On 12" centers

NAILER: Varies by width, factory installed

FINISH: Mill

Formed Steel Curb

SHELL & 18-GA galvanized steel; All seams are fully

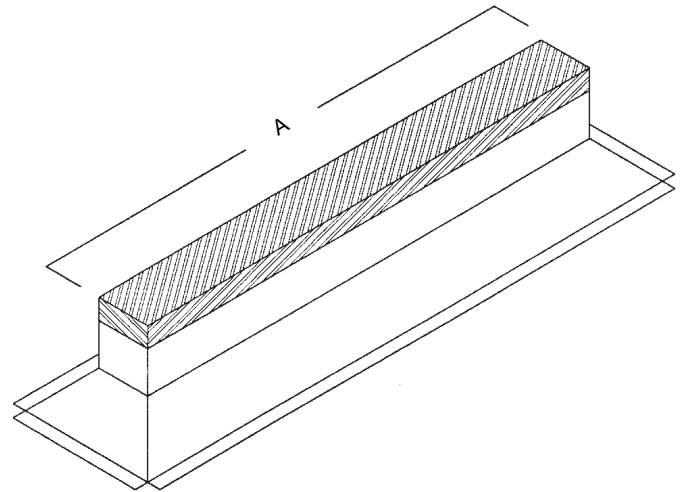
BASE PLATE: welded and sprayed with protective coating

CANT: Mitered 3" x 3" integral cant

REINFORCEMENTS: On 12" centers

NAILER: Varies by width, factory installed

FINISH: Mill



OPTIONS

Material Aluminum - Available in .081-.125 thick 3003-H14 alloy

Material Steel - Available in various gauges of galvanized, galvaneal or stainless

Pitched or Peaked - In conjunction with the overall dimensions, both the height rise, specified in linear inches per foot (ex: 3" in 12") and the direction of the pitch must be specified.

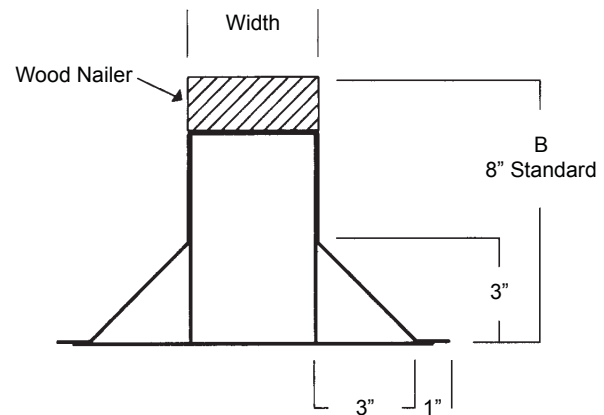
Counterflashing - A removable metal cap fabricated of the same material as the equipment support provides for an effective method of attaching roofing felts.

Gasket - 1/4" thick polyurethane foam gasket can be installed, lining the entire top perimeter. Gasket can be used in place of, or in addition to a wood nailer.

Finishes - A wide selection of finishes include baked enamel, epoxy, or prime coat.

NOTES

1. "A" and "B" are opening dimensions.
2. If either dimension exceeds 90", multi-section construction may be required.



EQUIPMENT SUPPORT WIDTH

Nominal Width	Actual Nailer Width
4"	3½"
6"	5½"
8"	7½"
10"	9½"
12"	11½"

air balance

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MODEL EC

Standard Cant Equipment Support • Aluminum or Steel

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MODEL ER

Raised Cant Equipment Support • Aluminum or Steel

STANDARD MATERIALS AND CONSTRUCTION

Formed Aluminum Curb

SHELL & .063" thick aluminum alloy 3003-H14; All seams

BASE PLATE: are fully welded and sprayed with protective coating

INSULATION: 1" semi-rigid berglass

CANT: Mitered 3" x 3" integral cant

REINFORCEMENTS: On 12" centers

NAILER: Varies by width, factory installed

FINISH: Mill

Formed Steel Curb

SHELL & 18-GA galvanized steel; All seams are fully

BASE PLATE: welded and sprayed with protective coating

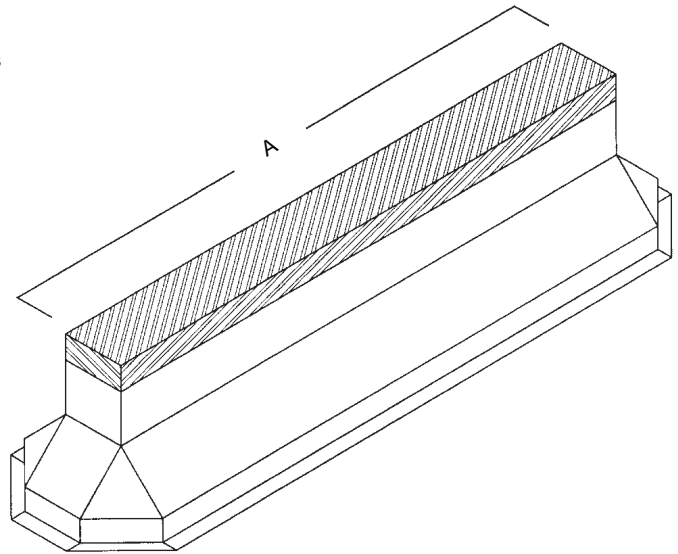
INSULATION: 1" semi-rigid berglass

CANT: Mitered 3" x 3" integral cant

REINFORCEMENTS: On 12" centers

NAILER: Varies by width, factory installed

FINISH: Mill



OPTIONS

Material Aluminum - Available in .081-.125 thick 3003-H14 alloy

Material Steel - Available in various gauges of galvanized, galvaneal or stainless

Pitched or Peaked - In conjunction with the overall dimensions, both the height rise, specified in linear inches per foot (ex: 3" in 12") and the direction of the pitch must be specified.

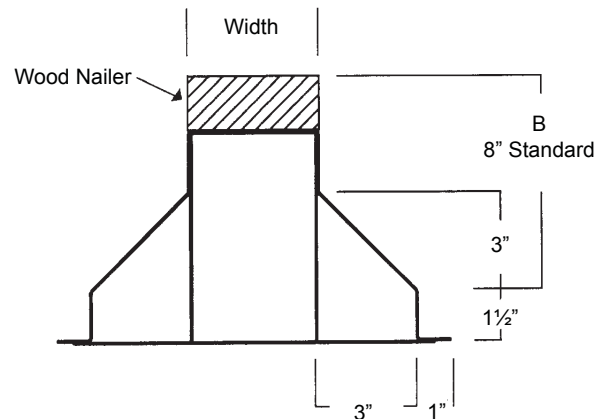
Counterflashing - A removable metal cap fabricated of the same material as the equipment support provides for an effective method of attaching roofing felts.

Gasket - 1/4" thick polyurethane foam gasket can be installed, lining the entire top perimeter. Gasket can be used in place of, or in addition to a wood nailer.

Finishes - A wide selection of finishes include baked enamel, epoxy, or prime coat. Aluminum curb finishes include Kynar, clear or color anodize.

NOTES

1. "A" and "B" are opening dimensions.
2. If either dimension exceeds 90", multi-section construction may be required.



EQUIPMENT SUPPORT WIDTH

Nominal Width	Actual Nailer Width
4"	3 1/2"
6"	5 1/2"
8"	7 1/2"
10"	9 1/2"
12"	11 1/2"

air balance

Dampers  Louvers
UL Life Safety Products
Division of Mestek
Member of AMCA

MODEL ER

Raised Cant Equipment Support • Aluminum or Steel

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MODEL EF

Self Flashing Equipment Support • Aluminum or Steel

STANDARD MATERIALS AND CONSTRUCTION

Formed Aluminum Curb

SHELL & .063" thick aluminum alloy 3003-H14; All seams

BASE PLATE: are fully welded and sprayed with protective coating

REINFORCEMENTS: On 12" centers

NAILER: Varies by width, factory installed

FINISH: Mill

Formed Steel Curb

SHELL & 18-GA galvanized steel; All seams are fully

BASE PLATE: welded and sprayed with protective coating

REINFORCEMENTS: On 12" centers

NAILER: Varies by width, factory installed

FINISH: Mill

OPTIONS

Material Aluminum - Available in .081-.125 thick 3003-H14 alloy

Material Steel - Available in various gauges of galvanized, galvaneal or stainless

Pitched or Peaked - In conjunction with the overall dimensions, both the height rise, specified in linear inches per foot (ex: 3" in 12") and the direction of the pitch must be specified.

Counterflashing - A removable metal cap fabricated of the same material as the equipment support provides for an effective method of attaching roofing felts.

Corners - Solid welded corners may be added to the self flashing angle on the bottom.

Gasket - 1/4" thick polyurethane foam gasket can be installed, lining the entire top perimeter. Gasket can be used in place of, or in addition to a wood nailer.

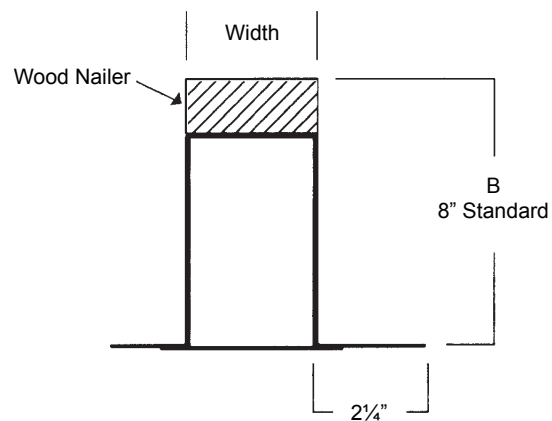
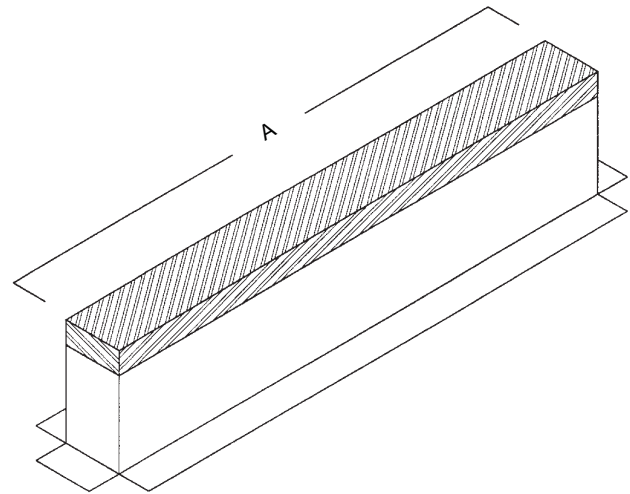
Finishes - A wide selection of finishes include baked enamel, epoxy, or prime coat. Aluminum curb finishes include Kynar, clear or color anodize.

NOTES

1. "A" and "B" are opening dimensions.
2. If either dimension exceeds 90", multi-section construction may be required.

EQUIPMENT SUPPORT WIDTH

Nominal Width	Actual Nailer Width
4"	3½"
6"	5½"
8"	7½"
10"	9½"
12"	11½"



air balance

Dampers  Louvers
UL Life Safety Products
Division of Mestek
Member of AMCA

MODEL EF

Self Flashing Equipment Support • Aluminum or Steel

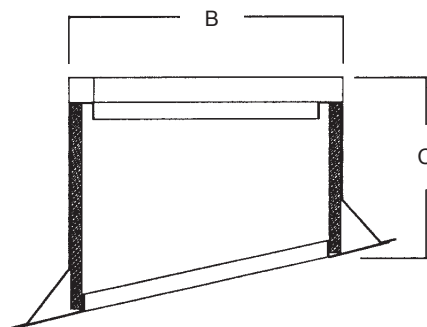
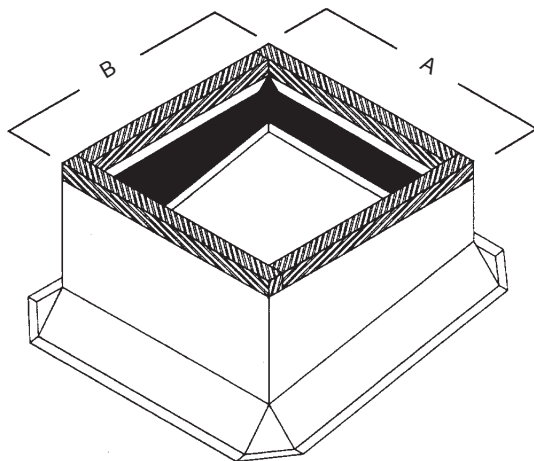
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Pitched or Peaked Curbs

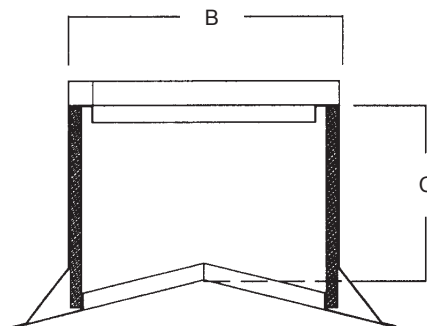
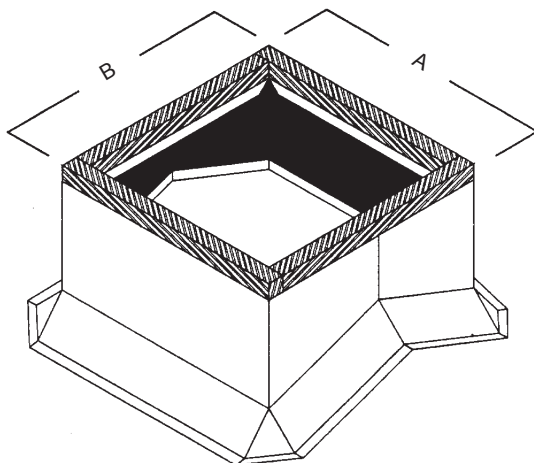
NOTES

All curbs and equipment support models are available pitched or peaked. Any pitch may be fabricated by specifying the height increase, in inches, per every linear foot (ex. 3" in 12"). Pitch must be specified from the "B" dimension. If either dimension exceeds 90", multi-section construction may be required.

PITCHED



PEAKED



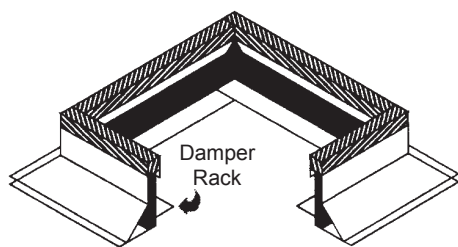
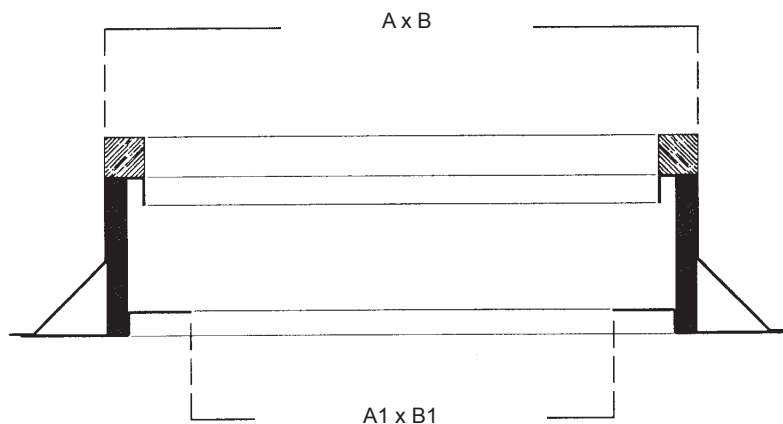
Pitched or Peaked Curbs

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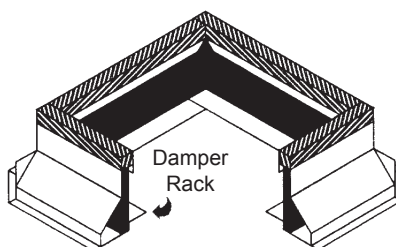
Curb Damper Racks

NOTES

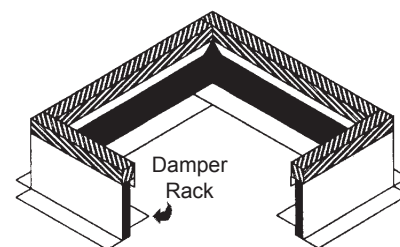
All curb models are available with damper racks. Damper racks are fabricated of the same material and gauge as the curb. Damper rack angles are located in the bottom of the curb to eliminate interference with equipment mounted on top of the curb. Curb dimensions are specified to the outside perimeter of the top of the curb (A x B). Damper rack dimensions must be specified to the inside dimension of the damper rack angle (A1 x B1).



Canted



Raised Cant



Self Flashing

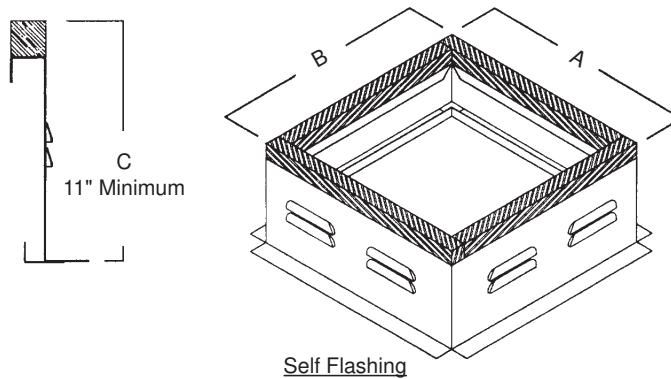
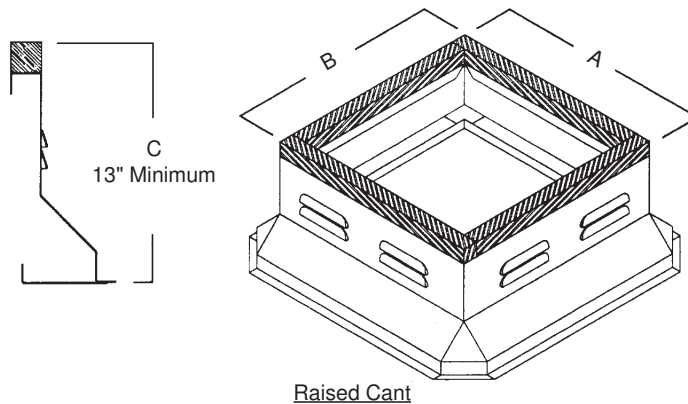
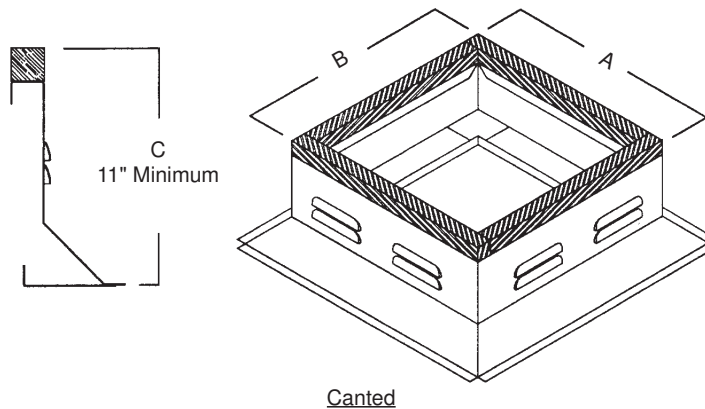
Curb Damper Racks

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Louvered Curbs

NOTES

All curb models are available with louvered vents. Louvered vents are 6"W x 7/8"H, spaced at 1/2" with 4 louvers per side. Free area per louver is 1 1/2 sq.in. Curb models with insulation as standard will not be insulated to eliminate interference with the airflow through the louvered vent. If either dimension exceeds 90", multi-section construction may be required.



Louvered Curbs

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